CHAMBERS BRICK MACHINERY

Catalogue No. 21

CHAMBERS BROTHERS COMPANY

Fifty-Second Street below Lancaster Avenue

PHILADELPHIA, PA.

SALES BRANCHES

CHICAGO, ILLINOIS
524 West Jackson Boulevard

LONDON, ENGLAND
55 Chancery Lane

EDWARD B. JUSTICE, London Agent

Joseph F. Neussendorfer

Joseph F. Neunsendorfer

Established 1857
Incorporated 1888

Cable Address:
Chambers, Philadelphia

CATALOGUE No. 21

Brickmaking Machinery

Clay Grinding and Mixing Machines

Built by

CHAMBERS BROTHERS COMPANY

Fifty-second Street, South of Lancaster Avenue

PHILADELPHIA, PA., U.S.A.

CYRUS CHAMBERS, JR. President
S. BERNARD CHAMBERS, Treasurer

J. HOWARD CHAMBERS, General Manager
HOWARD K. KING, Mechanical Engineer

CYRUS CHAMBERS, JR., President.

CHAMBERS BROTHERS COMPANY, PHILADELPHIA, PA.

The first American inventor to successfully reduce to practice an Automatic cutter for Continuous Steam Brickmaking Machines.

DO NOT GIVE the purchase price, or first cost, of a piece of brickmaking machinery too much prominence in your consideration. The question of greater output, uninterrupted work, greater durability, continuous brickmaking service, are of far more importance. The price is in our machine, and no one profits so much from the relative higher first cost of a well-made brick machine as does the brick manufacturer who uses it.

TABLE OF CONTENTS.

CHAMBERS BROTHERS COMPANY'S BRICKMAKING MACHINERY.

THE CHAMBERS BRICK MACHINE PATENT.

Our brickmaking machines are the subject of a number of separate and distinct patents of the United States.

When we made application for our first patent on brick machines, our invention was *so novel that not a single patent had ever been granted by the United States Patent Office* for this class of brickmaking machines.

Letters	Patent	No.	612,232,	granted	Oct. 11, 1898.
"	"	"	612,247,	"	Oct. 11, 1898.
"	"	"	612,249,	"	Oct. 11, 1898.
"	"	"	656,879,	"	Aug. 28, 1900.
"	"	"	656,880,	"	Aug. 28, 1900.
"	"	"	656,896,	"	Aug. 28, 1900.
"	"	"	663,688,	"	Dec. 11, 1900.
"	"	"	663,689,	"	Dec. 11, 1900.
"	"	"	678,259,	"	July 9, 1901.
"	"	"	687,915,	"	Dec. 3, 1901.
"	"	"	698,019,	"	April 22, 1902.
"	"	"	709,097,	"	Sept. 16, 1902.
"	"	"	721,152,	"	Feb. 24, 1903.
"	"	"	761,410,	"	May 31, 1904.
"	"	"	815,022,	"	Mar. 13, 1906.
"	"	"	944,442	"	Dec. 28, 1909.

FOREIGN PATENTS.

Our machines have been also patented in Canada, Great Britain, France, Austro-Hungary, Russia, Italy, Belgium, Spain, Cuba, Germany, Sweden, and Norway.

STANDARD SIZE BUILDING BRICKS.

The dimensions adopted by the NATIONAL BRICK MANUFACTURERS' ASSOCIATION for a standard hard-burned common building brick are 8¼ x 4 x 2¼ inches, and for a pressed front brick, 8⅜ x 4 x 2⅜ inches. The advertised capacity of our various machines, as described in this catalogue, is ample for these sizes of bricks.

We construct our machines to make the size brick used in the locality for which it is wanted; and, if it is desired, the size can be changed within certain limits, after the machine is completed, at reasonable cost. Bricks of larger size than STANDARD should be discouraged. They not only require more material; but involve increased cost through reduced machine output, slower drying, fewer brick set in the kiln, more fuel, oftentimes more labor and greater expense in delivery.

Among the various sizes of STREET PAVING BLOCK the following are noted as giving good service—viz.: 8½ x 4 x 3½ inches; 8½ x 4 x 3 inches; 8¾ x 4 x 3½ inches, weighing about 10 pounds each; 8¾ x 4 x 3 inches weighing about 9¾ pounds.

THE STIFF-TEMPERED PROCESS.

For the past forty-five years the *personnel* of this Company has engaged in building Brick Machinery, and a careful review of the history of the clay-working art to this time serves to renew the conviction that our determination to work within the field of STIFF-TEMPERED PROCESS BRICKMAKING is based upon correct principles.

So far as practical results testify, this class of machines, with its product, has been the most generally successful,—has gained the approbation alike of brickmaker, builder, engineer, and architect, and for the production of building and sewer brick, as well as brick for paving streets and roadways, will prove to be of most profitable and satisfactory use in a constantly broadening field.

Although clays containing a large percentage of quicksand are not workable by the stiff-tempered process, improvements in the details of our machines make them available for a much wider range of material and our OIL-LUBRICATED DIE for sticky clays has given great satisfaction in manufacturing from clays that otherwise would have been abandoned. We make several different patterns of augers usable on one size of brick machine alone, as well as various shapes and lengths of forming dies. Wherever our machines have been well introduced they will be found making a large proportion of the brick of that locality; and we regard this fact as among the most conclusive evidences of the value of our inventions, as well as the thoroughly first-class manner in which our machinery is designed and built.

Prospective customers should send us with their inquiry four or five pounds of their clay for examination, accompanied with as much information as to general nature and conditions of the deposit as possible. Should an examination show the desirability of a practical test in an operating brick

machine, we will so recommend, and in this case about five barrelfuls should be sent to us, freight prepaid. We prefer a practical test, and keep a full-sized machine at our works in readiness for this purpose.

OUR PROCESS is that of tempering and expressing the tempered clay in a plastic condition through a die, coating the surfaces of the bar of clay with sand, and then severing it into bricks. These different operations are entirely automatic, and the cutting mechanism is so completely under the control of the continuously moving clay-bar that it operates successfully whether the product is twenty bricks or over two hundred bricks per minute.

Our long experience with clay working machinery, and the great varieties of clays worked, has enabled us to construct machines adapted to the art of brickmaking which at once impress the practical man with favor. All of the main movements are rotary and continuous, and these parts have their journals in one solid casting. The machines are self-contained, are mounted upon an iron framework, and thus cannot settle out of line. All wearing parts are easily renewed.

Each casting has a letter and number cast upon it designating the size, style of machine, and the particular piece, and these, being fitted to a system of standard gauges, can be promptly duplicated. Our machinery is complete with the little conveniences for its easy care and durability.

Plan for Tempering the Clay.

The clay may sometimes be taken direct from the bank and dumped on the platform covering the machine at the side of a galvanized-iron hopper that leads into the tempering case of the machine and mixed, when necessary, with *loam, sand,* or *coal-dust;* and the requisite amount of *water* being added to temper the clay to the proper consistency, the mass is shovelled into the hopper and falls into the machine.

While it is quite possible to make a very fair brick by feeding the clay directly into the brick machine, with no more mixing or grinding than is given by the brick machine itself, a much better result will be obtained by the use of some good supplemental Mixing and Pugging Mill.

There are comparatively few clay banks operated in which the clay is of the same quality from top to bottom, and a thorough mixture of such material, in addition to the ordinary process of tempering, results in a brick of more homogeneous texture, in which the shrinkage is uniform throughout all parts, and the bricks are stronger.

The percentage of cracked or broken bricks is reduced to a minimum, while the brick machine works with more ease and regularity because of the uniform supply of well-prepared material.

The grinding of the clay to reduce the lumps, reject or grind small stones, pieces of ore, etc., is of equal importance; and many of the subsequent difficulties of manufacture may be avoided by intelligent attention to the proper preparation of material.

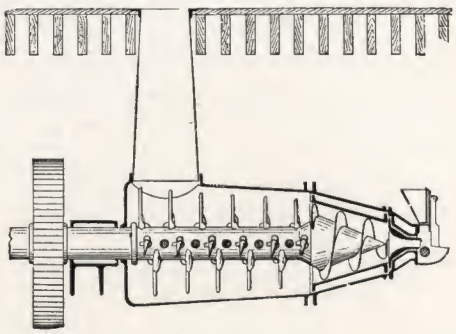
The type of clay grinding machine to be selected must be determined by the character of the material and the amount of moisture carried. Dry-

Pans, Disintegrators, Stone-Extracting Rolls, Smooth-Face Roll-Crushers, are all shown in this catalogue, and all have their proper use under certain conditions.

The Tempering Device.

The tempering portion of the machine (Fig. 1) consists of a strong cast-iron conical case, in which revolves a horizontal shaft into which are set,

FIG. 1.



spirally, strong tempering knives, or blades of wrought iron or steel, so that, as they pass through the clay, they move it forward. The clay being stiff, and not having much water on it, is not liable to *slip* before the knives, but is cut through and through, and *thoroughly* tempered, the air escaping back through the untempered clay, so that by the time the clay reaches the small end of the tempering case it is ready to be formed into bricks.

Recessed Shaft and Knife.

An important improvement in the tempering device consists of enlarging the tempering shaft, turning it smooth, and then recessing the tempering knives

FIG. 2.

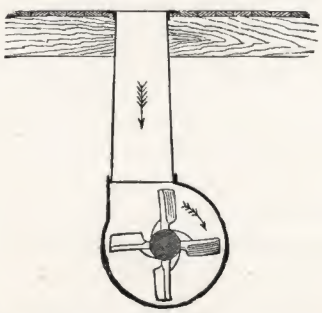
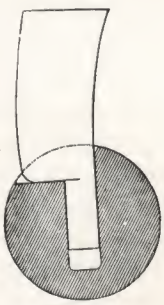


FIG. 3.



into the shaft. Their forward edge is embedded in the shaft below its surface, and the back of the knife supported or re-enforced above the neck by its bearing against the body of the shaft.

The recess prevents the knife from turning flatwise and breaking should it get loose. (See Fig. 3.)

The body of this shaft being free from obstructions and turned smooth, the clay slides freely on it, being fed clear down to its surface by the knives. Their edge being below the surface of the shaft, there is no place for clay, roots, or stones to lodge between the knife and shaft.

Forming the Tempered Clay into a Brick Bar.

On the end of the tempering shaft is secured a very hard conical screw, smoothly polished, which revolves in a conical case, the inside of which is fluted lengthwise, so as to prevent the clay revolving in it. (See Fig. 1.)

Provision is made for steam heating this case, as well as for heating the die, although this feature need not be used if the clay does not require it.

Fig. 4 shows the hinged DIE CASE with one shape of end-cut brick die inserted. By this means the angles of the clay bar are re-inforced and made very solid and sharp, thus insuring square and well defined corners to the bricks.

The " die case " is secured to the screw-case by a hinge and swinging bolt, so that it may be quickly swung open for the removal of stones. This swinging bolt is secured to the case by a pin of just sufficient strength to hold under normal conditions, and when undue strain comes from hard clay, etc., it yields, thus forming a safeguard against accidents arising from improper tempering. This " die case " is also heated by steam, to facilitate the forming and sliding of the clay.

The forming and finishing part of the die is a lining, that can be removed and renewed in a few minutes, thus enabling us to always keep our dies (or moulds), and consequently the bricks, to standard size.

The Manufacture of Shapes and Hollow Building Bricks.

Our brick machines may be fitted with special dies for the production of various shaped bricks, such as " skew-backs," " arch," and for hollow bricks having one, two, or three holes.

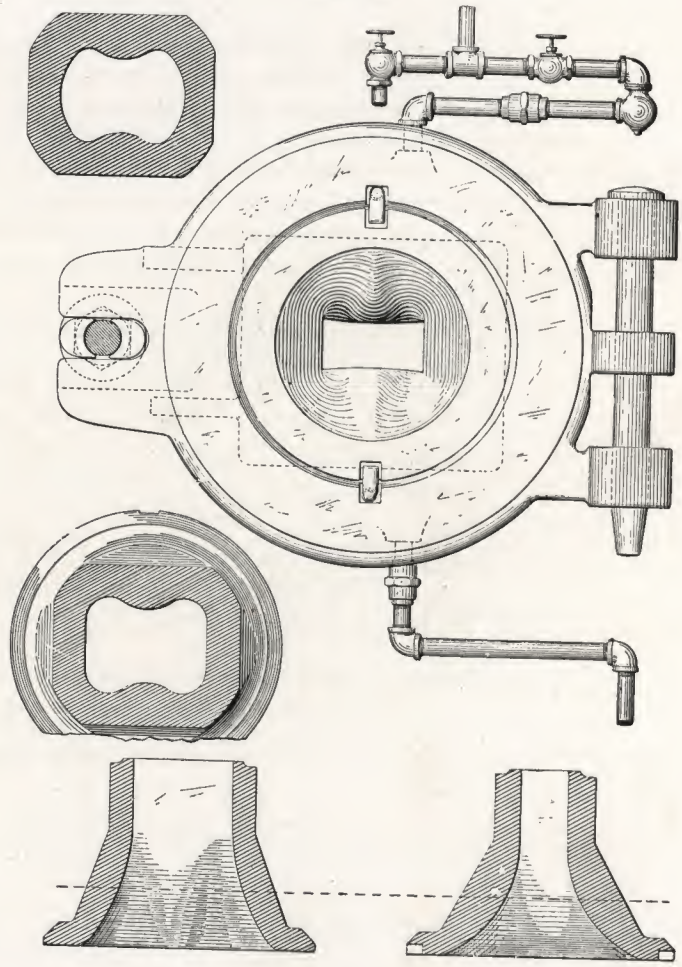
The Oil Lubricated Dies.

(U. S. Patent No. 721,152, February 24, 1903.)

All of our side-cut brick machines are equipped with a lubricating die, by means of which a thin film of oil or other lubricating fluid is supplied to the inner surface of the die under pressure sufficient to prevent the clay from clogging the openings through which the lubricant is forced. To secure this result, we sometimes use a pressure tank having direct connection with the steam boiler, and in other cases use a small automatic pump of special construction attached to the brick machine. With one or the other of these devices we secure constant and uniform lubrication of the bar of clay while it is being formed through the die, no matter how stiff the clay may be worked. This lubrication largely overcomes the friction between the surfaces of the clay-bar and the die, and not only prevents ruffled corners, but tends to cause all parts of the bar of clay to move through the die at the same speed.

Similar dies with lubricating apparatus can be made to suit our end-cut brick machines, and are found necessary when working what may be called sticky clays,—those that, while plastic and of good quality for brickmaking, will yet not mould freely, but stick to the sides of the die.

FIG. 4.



Our standard steam-heated or dry die, being of simple construction and less expensive, is to be preferred where it will work the clay. End-cut machines are always equipped with our *Standard Steam-heated Die* unless tests or examination have shown the other necessary and contracted for.

One customer using an end-cut machine with oil die and pressure pump reports that with the oil die he made from 80 to 90 bricks per minute with the consumption of 12 barrow loads of coal as against an output of 60 to 65 bricks per minute with 16 barrow loads of coal when using the dry die.

A mixture of one-third fish oil with two-thirds coal oil is recommended and the consumption of oil is about 1 gallon to 9000 of bricks made.

The Sanding Device.

As the bar of clay issues from the forming-die, it passes through a small chamber filled with fine dry sand, which adheres to the surface of the bricks. The surplus sand is kept back in the chamber by swinging elastic scrapers, which allow the bar to escape with its adhering sand.

This sanded surface of the clay-bar renders the bricks, when green, much nicer to handle, prevents them from sticking together on the barrows or in the hacks, or on the *drying cars,* and produces a sanded surface of pleasing effect.

It is the result of a great many experiments, being the subject of four patents, and performs the function of sanding the brick after it has been moulded, a thing never before successfully accomplished by machinery.

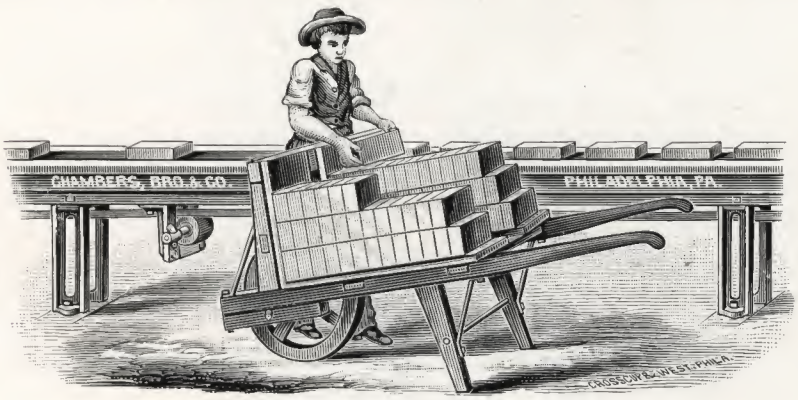
The brick machine may be operated without the use of the Sander when desired.

Provision for Stones.

The tempering knives are not long enough to reach the sides of the tempering case so that there is always a lining of clay between knives and case and should large stones accidentally get into the machine they are often embedded in this clay lining. A stone passing to and lodging in the die will prevent the proper flow of clay. This die being attached to a case secured to the machine by a hinged connection it can be quickly swung open, the stone removed, and machine again started. A safety-pin device holding the hinged die case in normal position will yield under excessive strain, thus automatically relieving the machine.

Off-Bearing.

The bricks cut from the continuous bar are separated and carried by an endless belt any desired distance, sometimes two hundred feet across the yard, from which the bricks may be wheeled to any point most convenient for "hacking," or loaded directly upon the dryer-cars, as may be required.



The Automatic Wire Cut-Off for End-Cut Bricks.

In the development of our Auger Brick Machine we have invented and used several forms of automatic cutters,—the single knife, spiral blade, revolving disk, and endless belt wire cutter,—but none so simple and efficient in all materials as our

Automatic Reel Wire Cutter

shown pages 15 to 18. It has made possible the great success attained by our machines, and excites unfailing admiration. It is self-regulating, its speed being controlled by the moving clay-bar, which may be ten bricks per minute or five hundred bricks per minute.

It consists of a regulating frame or table, on to which the clay-bar is carried and by means of which the speed of the cutter is controlled.

The belt carrying the clay-bar runs around a measuring wheel, which determines the length the bricks are to be cut.

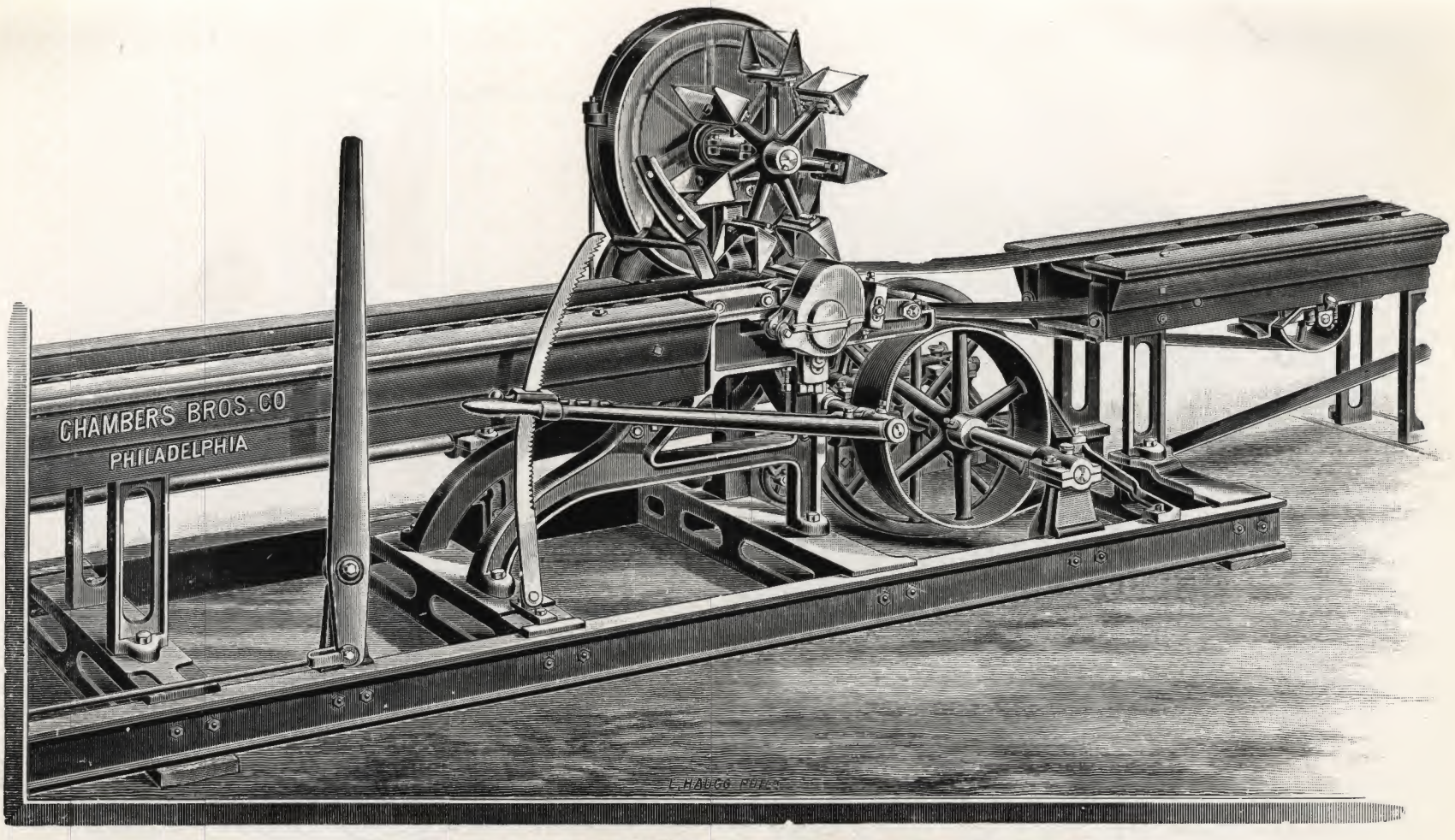
The cut-off wires are strained on steel bows or springs to the proper tension to cut, and yield readily to obstructions.

The wires are carried by their springs on a sprocket-wheel over and through the clay-bar, and are guided square by a cam encased in a dirt-tight case.

The partly severed brick is supported and held against the clay-bar until completely severed, when it is dropped on to the off-bearing belt and promptly carried off, thus permitting the return of the wire above the clay-bar again between the brick and the end of the bar. Bricks of uniform lengths with square heads cut with such smoothness as a fine steel wire will give are thus secured.

The wires either cut around the stones or spring over them. Should a wire break, it can be renewed at once.

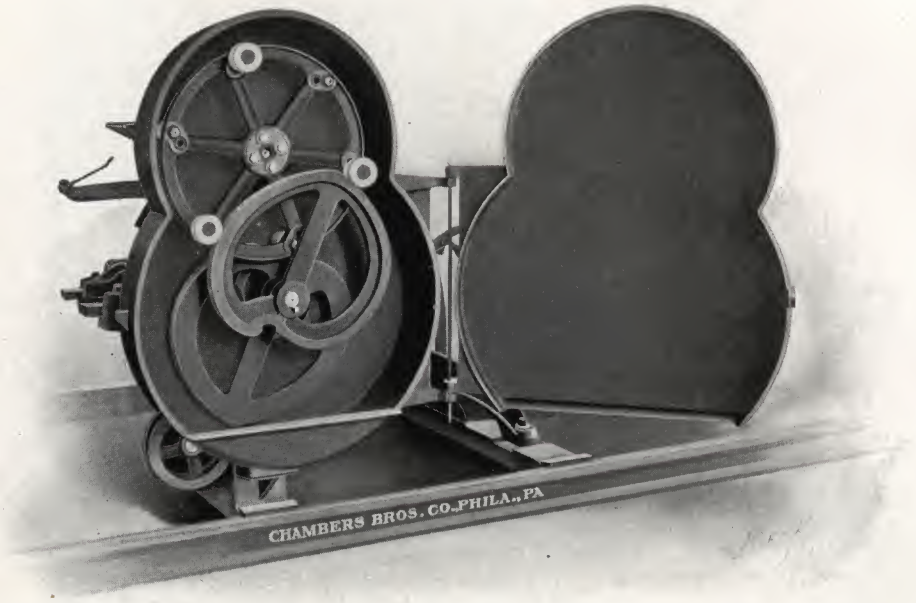
The length of the bricks can be changed at a small cost for duplicate parts.



The Chambers Automatic Wire Cutter No. 1 for End-Cut Bricks.

Will cut and separate from the continuously moving clay-bar over two hundred bricks per minute. (See page 14.)
(See also description of No. 8 End-cutter, pages 16 to 18.)

New No. 8 Brick Cutter.



This new Automatic End-cutter for our Auger Brick Machines has now been fully tested by continuous use on the part of our customers, with such gratifying results that we offer it under the broadest guarantee.

We recommend our customers to substitute it for the older patterns previously furnished with our machines, feeling confident that its advantages will soon manifest themselves, and pay its users a handsome return upon the cost.

The essential feature of difference is that the cam roller wheel has three lugs on each side, and these consist of steel pins, carrying steel rollers. These rollers are bushed with a self-lubricating bushing, and do not require oiling. They roll against the face of the cam, instead of sliding, as is the case with the old cutter, and this rolling contact does away with wear between the tappet and the cam. There being no sliding contact, it is not necessary to lubricate the face of the cam, or the rollers, consequently there is no oil or grease in the bottom of the cam case, and the trouble arising from getting the friction belt greased is obviated.

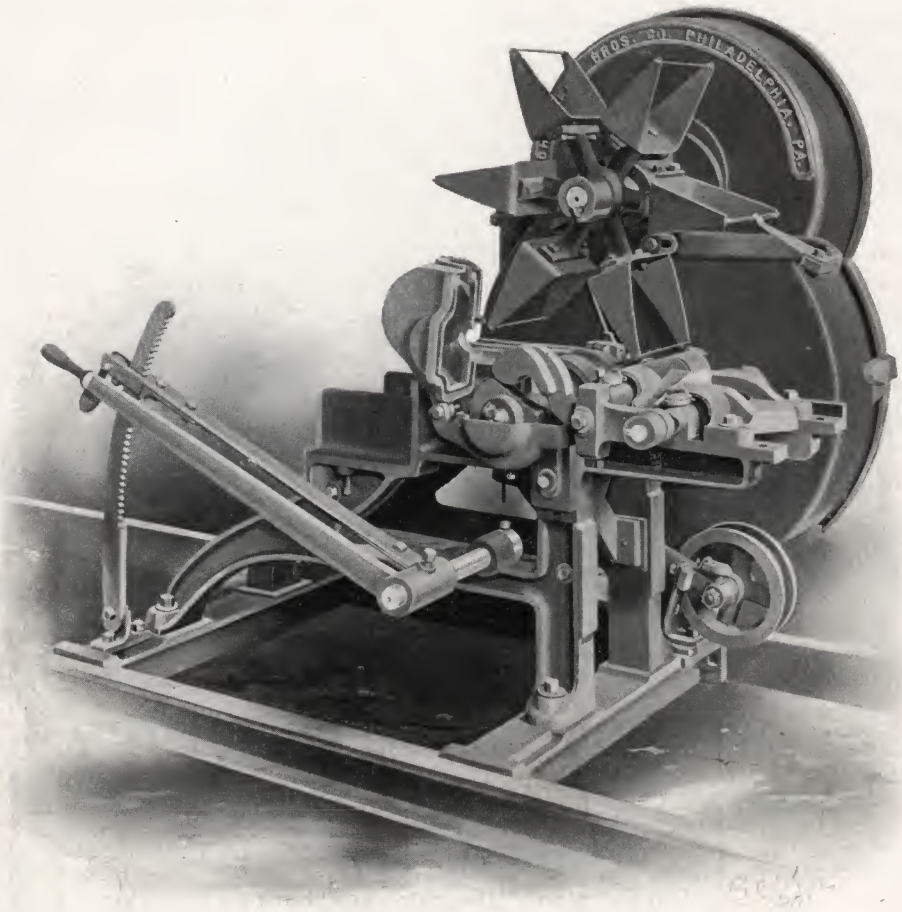
The cam is a double cam on which two rollers are in contact at all times, thus taking up all back lash. This makes it impossible for the wire to be pushed out of position by any hard substance in the clay bar; or, in other words, the wire must always travel in the straight path, as determined by the shape of the cam. The only deflection will be a deflection through the elasticity of the wire itself, and even a large stone against the wire cannot

push the roller away from the face of the cam. Where the clay is well prepared, the brick will be cut straight, and this condition will be maintained with small expense for renewal of parts.

In this new cutter the cam itself drives the wire reel, and any little obstruction in the clay under the wire simply makes the roller bear that much harder on the cam. It cannot by any possibility push the roller wheel away from the cam and cut a crooked head.

The friction belt is applied to a flanged wheel on the shaft of the measuring wheel itself, and does not appear in these illustrations, but, being applied to the measuring wheel shaft, it renders the cutter more easily regulated. In other words, the friction belt is applied directly to the cam shaft, and thus drives the wire reel.

One of the illustrations also shows a spring wire cleaner, applied on the delivery belt side of the cutter, instead of on the die side.

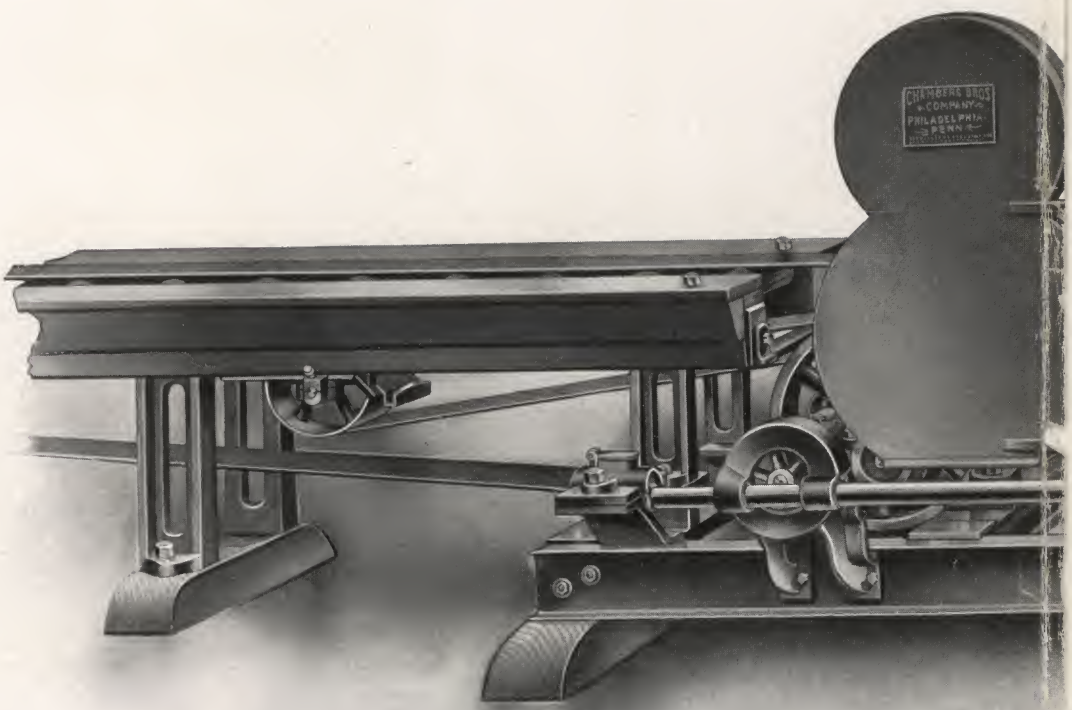


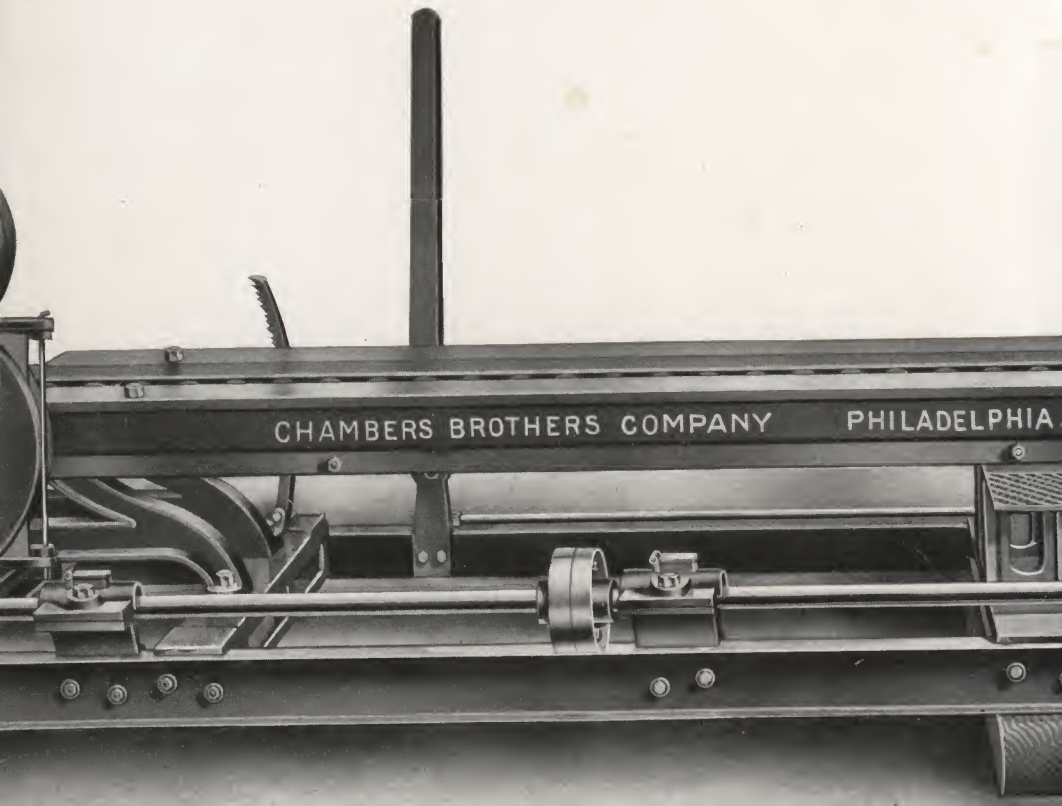
PATENTED MAY 31, 1904, AND MARCH 13, 1906.

Front View of No. 8 Automatic Brick-Cutter

showing the six elastic wire holders, the new spring wire cleaner, and the lever for controlling the frictional propelling belt.

The cutter is built under a system of jigs producing interchangeable parts, the cams being shaped by a cam generating machine, designed and built especially for this work. Any required length of brick can be furnished, and changes in lengths can be effected with assurance of accurate results. We have embodied in this cutter the results of careful observation, and study of the use of our earlier patterns has very largely eliminated wear resulting from use and minimized its effect. A new motion is given the delivery plate, which greatly improves the transfer of brick to the off-bearing belt. It is offered to our customers subject to trial and approval.

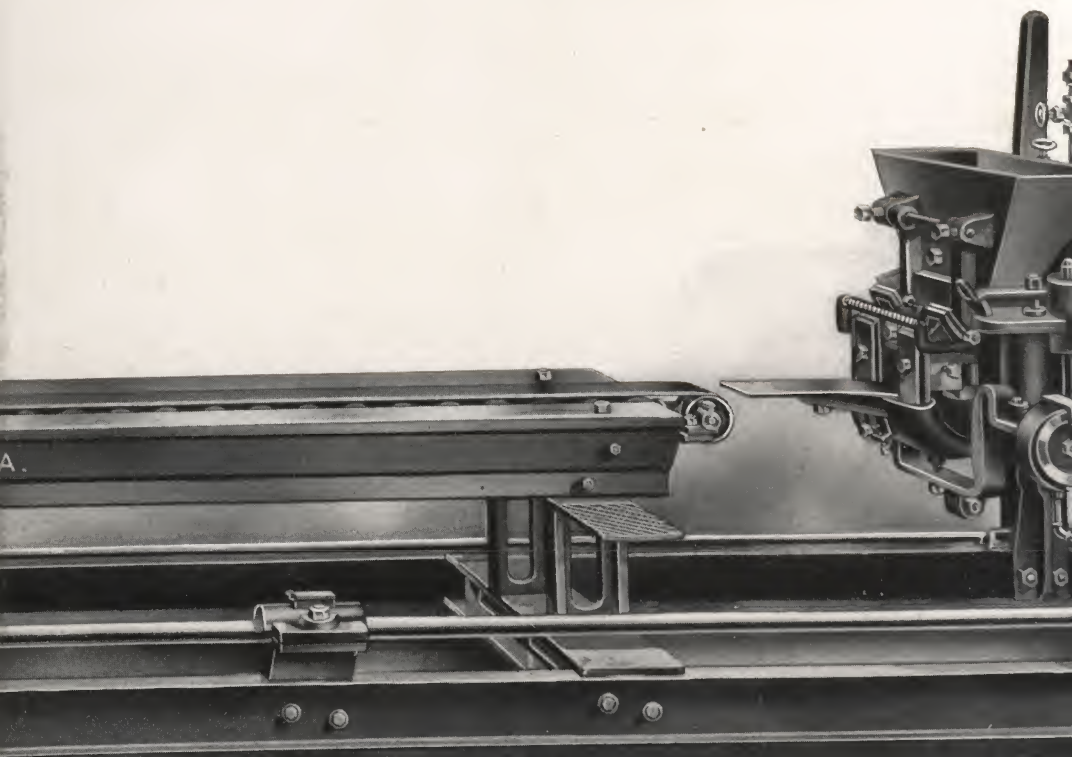

CHAMBERS BROS
COMPANY
PHILADELPHIA
PENN



THE CHAMBERS No. 7 END-CUT BRICK MACHINE

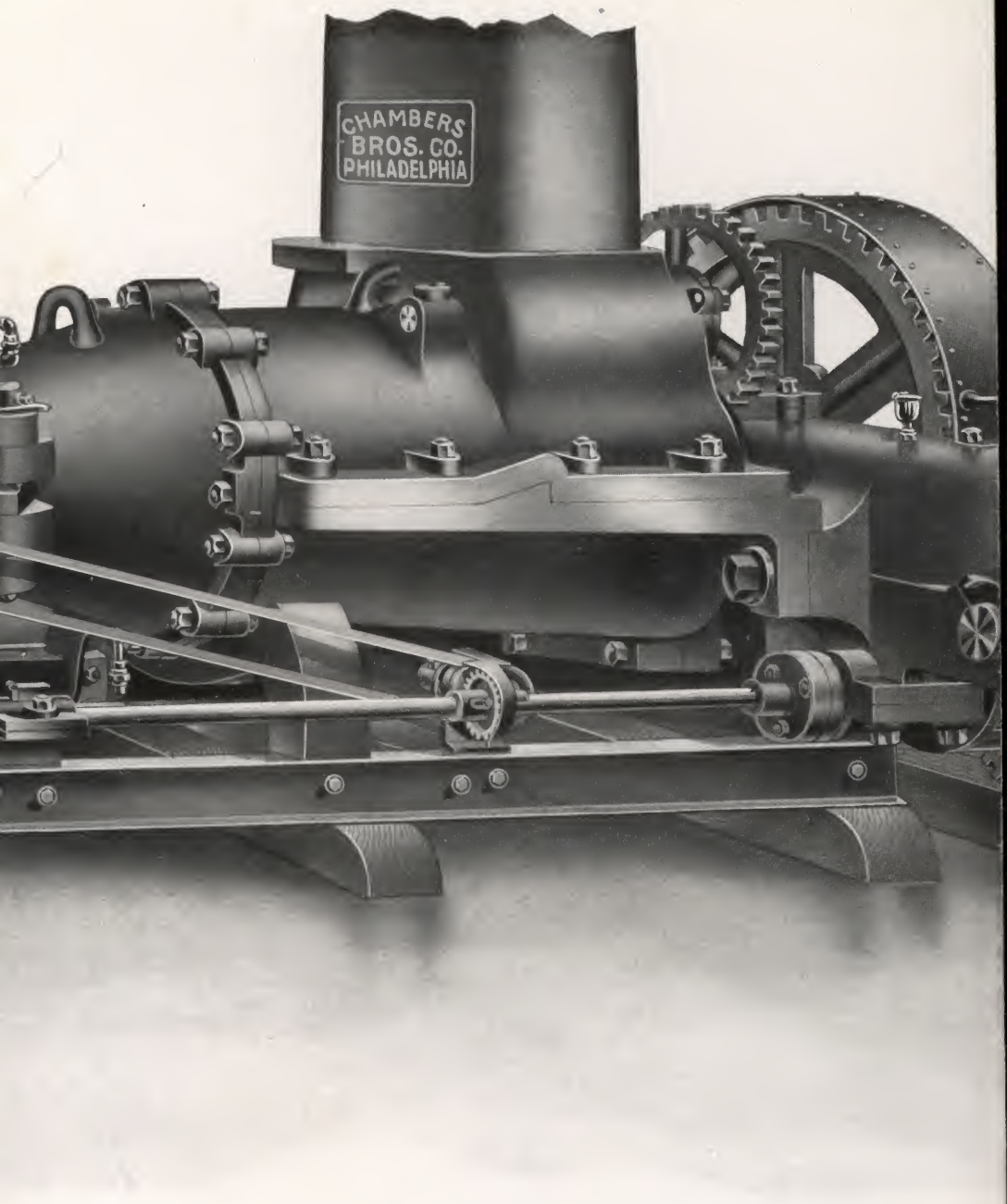
Automatically sands four sides of the clay bar.

The normal speed for driving pulleys on th
when such high speeds are contemplated,



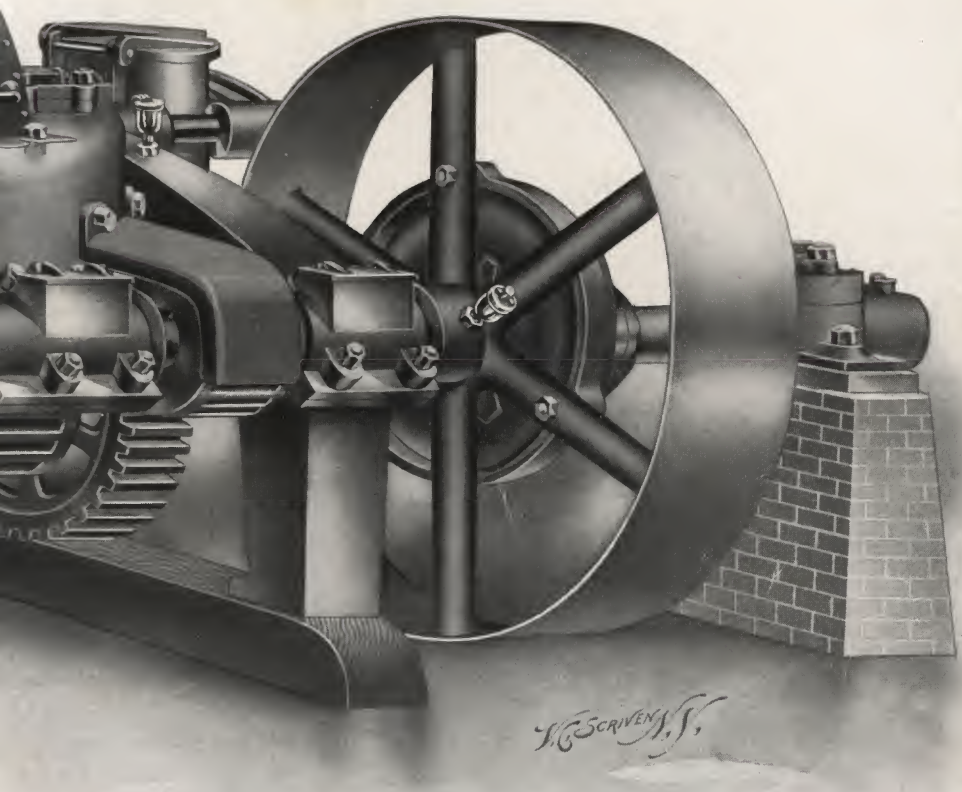
h the improved Automatic End-Cutter. Weight about ten tons. Floor space o
ormal output 6,000 bricks per hour. Under favorable conditions this has been i
machine is 220 revs. per minute. Some of our customers in the city of Chicago run the m
machine should be constructed under special specifications as to shafts, gears, etc., partic

CHAMBERS BROTHERS COMPANY, PHILADELPHIA.



ıpied is about 52 feet in length by 8 feet in width at gear end.
eased to as many as 25,000 bricks per hour.

ine at about 400 revs. per minute, and
s of which will be given in contracts.


J. G. SCRIVEN N. Y.

CHARLOTTE BRICK COMPANY

S. S. McNinch, President and Treasurer

Brick Works and Shipping Point, Grattan Station, S. C.

On Catawba River, Near Fort Mill, S. C.

CHARLOTTE, NORTH CAROLINA.

MESSRS. CHAMBERS BROTHERS CO., Philadelphia, Pa.

Gentlemen:—We have returned the old cutter, packing it in the same box in which the new cutter came, as per your instructions.

We have had your new No. 8 Cutter in for about three weeks, and have tested it at all speeds and find that it is a perfect cutting table. Our bricks are cut smooth and square no matter at what speed the column of clay may be moving. We break less wires, and believe that it takes less power to operate this table than the old one. We would not care to run our business without your new cutter, as the improvement is so great.

Wishing you continued success, we are,

Yours truly,

CHARLOTTE BRICK CO.

PER S. S. MCNINCH.

THE BARBER ASPHALT PAVING COMPANY

DES MOINES, IOWA, October 27th, 1909.

CHAMBERS BROS. CO.,
Philadelphia, Pa.

Dear Sirs:—We made 57,600 block on your machine the first day it was in operation. We are making block this morning at the rate of 9600 per hour, this being the second day of operation.

Very truly yours,

THE BARBER ASPHALT PAVING COMPANY,

(Signed) PAUL BEER,

Manager.

McKENZIE BRICK COMPANY

AUGUSTA, GA., October 15, 1909.

MR. LINCOLN S. MORRISON,
41 W. Hunter St., Atlanta, Ga.

Dear Sir:—Our plant has run out this year since starting up, in the neighborhood of eight millions of brick, which I think is a good recommendation for the Chambers Machine. I have never had a moment's trouble—not even having to tighten a bolt on the machine since its installation.

As this may be of some benefit to you some time, I gladly give any recommendation that the Chambers people might ask for.

Yours very truly,

McKENZIE BRICK CO.,

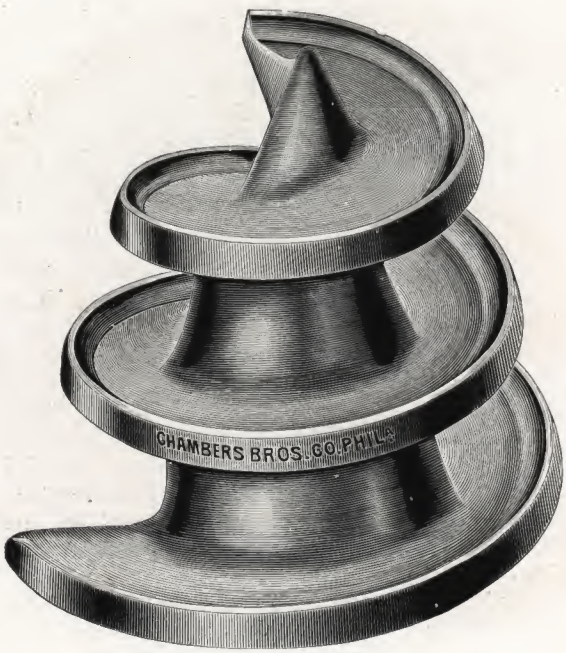
(Signed) J. H. McKENZIE, V. P.

Expressing Screws.

This particular part of our machine has been the subject of much study and costly experiment. Not only its shape, but the material from which it is made, as well as the manner of finishing, are of prime importance.

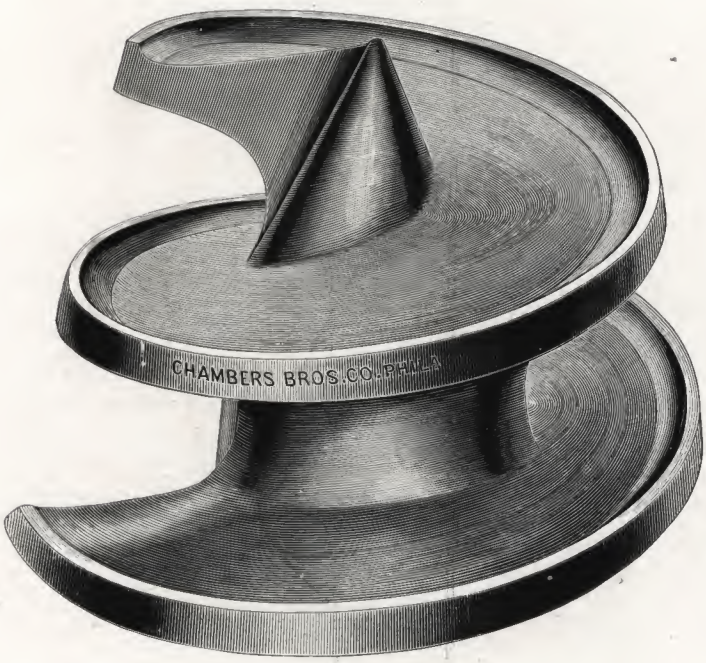
In the development of the Chambers Brick Machine we have had many designs of expressing screws, and illustrate herewith some of the most successful patterns for end-cut machines. We use screws of entirely different designs on machines making side-cut bricks. In filling orders for machines, we equip them with the design of screw that, from experience, is judged will produce the best results in the clay to be worked. The numbers given designate the style of screw, which are made of sizes to suit our different machines.

We make seven different patterns usable on one size brick machine.



Expressing screw, style " B 26 " used when working sandy or very loamy clays.

Expressing screw, style "B 349," used when working plastic clays that slide easily.



Expressing screw, style "B 428," represents designs made expressly for smooth, slippery clay and is of large capacity in suitable material. We have about twenty different patterns for screws of varying pitch and diameter.

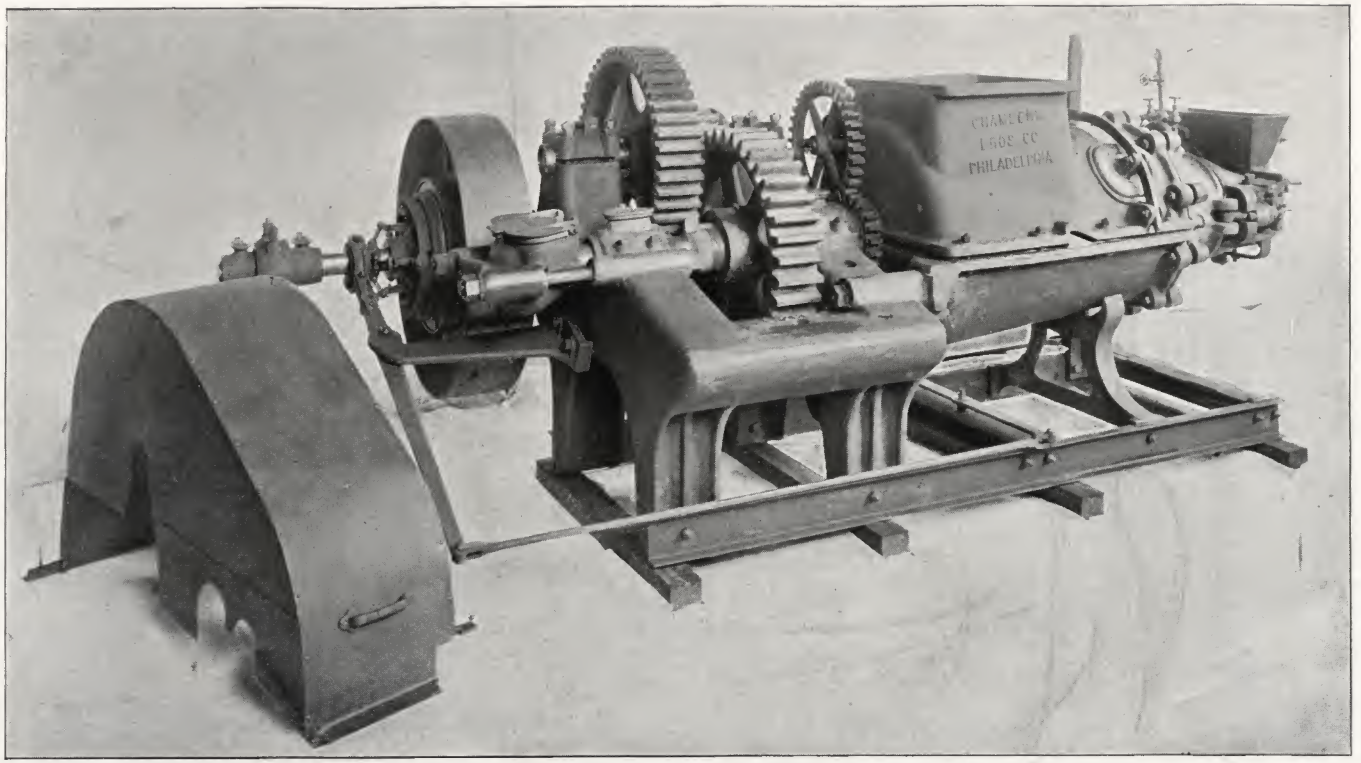
The Chambers Auger Brick Machine, No. 10.

This machine is from new patterns employing a large diameter of Master gear driven by steel pinion. Gear frame unusually heavy with broad feet for bolting to foundations. Driving shaft $3^{7}/_{16}$ inches diameter with friction clutch pulley 44 inches diameter by 12 inch face, outboard bearing for driving shaft is in pedestal bolted to the steel channels under the machine and also to the foundation. All journal bearings are babbitted, caps being planed and lipped and all conveniently located. Machine may be used for either end-cut or side-cut brick and all parts are easily accessible.

Will form a clay bar as large as 5½ x 11 inches. Machine is geared about five to one, 165 revolutions per minute of the driving pulley giving about 33 turns per minute of the pug shaft. From ground line to top of driving pulley is 4 feet 11 inches, and to top of hopper 4 feet 1 inch. From end of channels to face of die 12 feet 8 inches and from centre of pulley to face of die about 10 feet 5 inches. Greatest width of gear frame 6 feet 1 inch. This brick machine may be fitted with our No. 8 pattern end cutter (see pages 16 and 18), our No. 5 side cutter (see pages 29 and 30), or our No. 6 side cutter (pages 31 and 32).

The Chambers Auger Brick Machine, No. 20

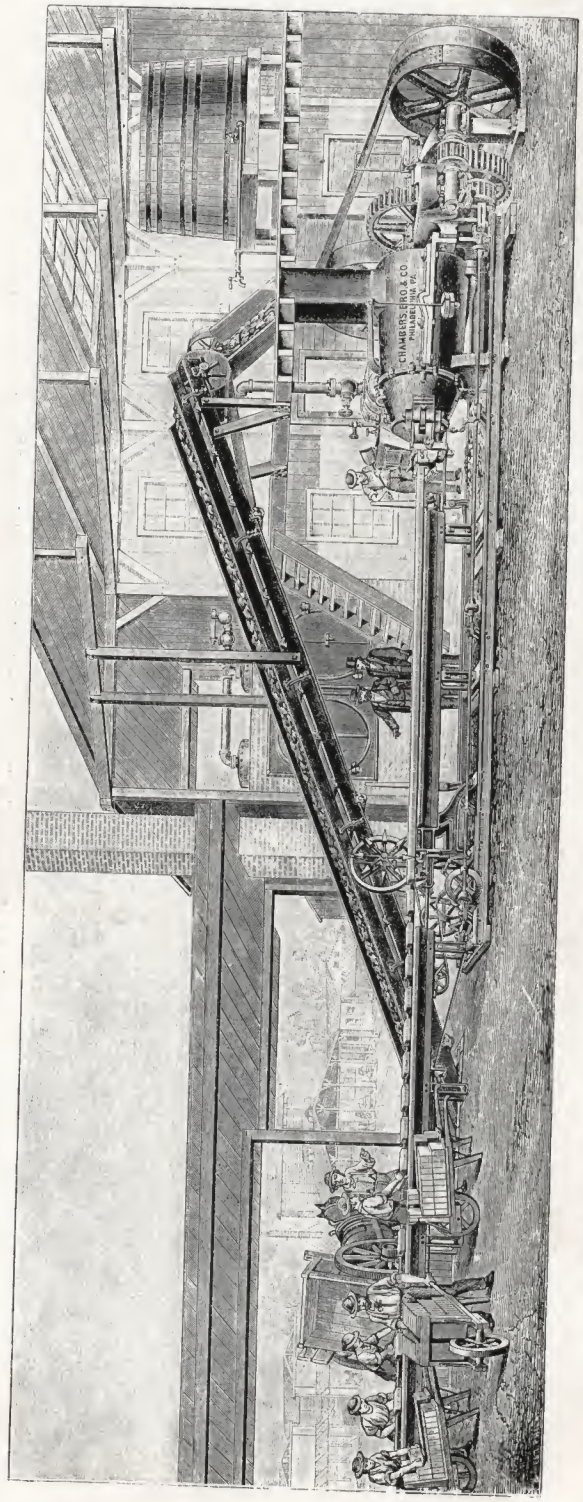
The Number 20 is of the same design as Number 10 and has an easy capacity of 20,000 bricks per day, having produced over 40 bricks per minute. Driving shaft $2^{15}/_{16}$ inches diameter. Clutch pulley 36 inches by 9 inches, outboard bearing for driving shaft being in a pedestal bolted to steel channel frames and also to the foundation. Machine may be used for either end-cut or side-cut brick. Length of end-cut machine, including 16 feet of delivery frame, is 47 feet 2 inches from edge of pulley: height from floor to hopper opening 3 feet 8 inches. Driving gears 5¼ inches face, ratio being about five to one. Pug-shaft 7 inches diameter, fitted with 18 knives. Speed of driving pulley from 165 to 210 revolutions per minute.



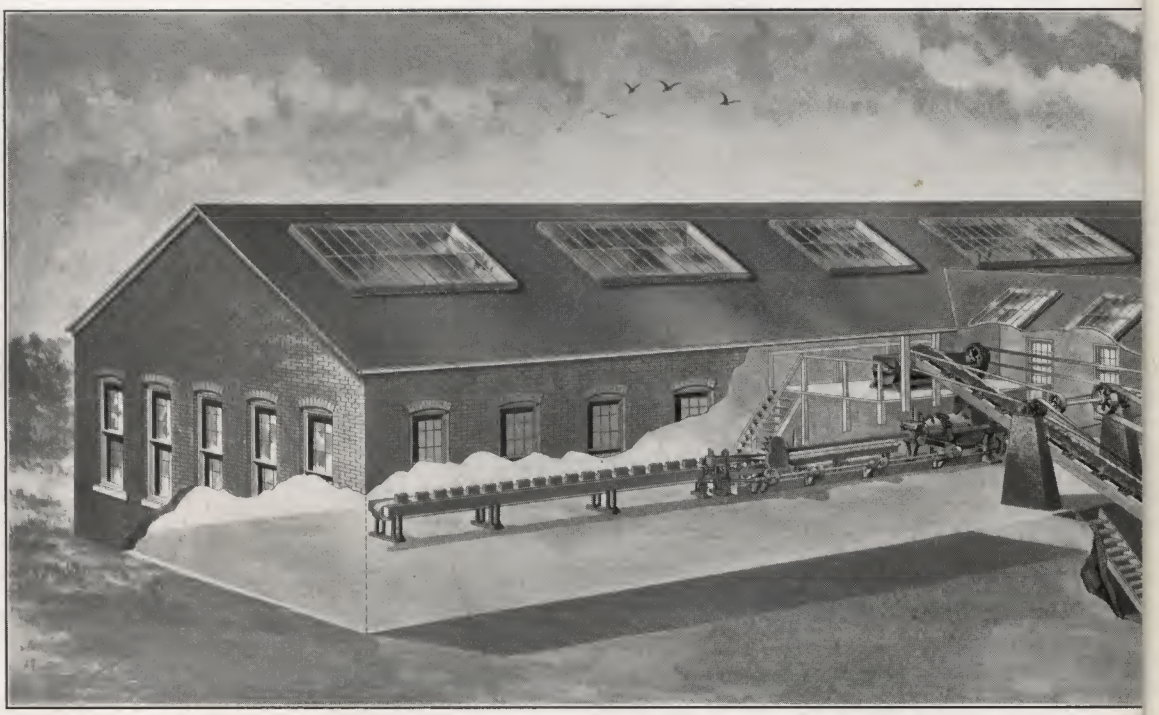
The Chambers Automatic End-Cut Brick Machine, No. 5.

This is a strong, substantial machine, designed to make 35,000 bricks per day of ten hours, and is mounted upon a framing of 5-inch channels. The driving shaft is $2^{15}/_{16}$ inches diameter; countershaft, $3^{7}/_{16}$ inches, and the journal bearings all in one solid casting. It has close-fitting metal gear cover and friction-clutch pulley 36 inches diameter by 8 inches face.

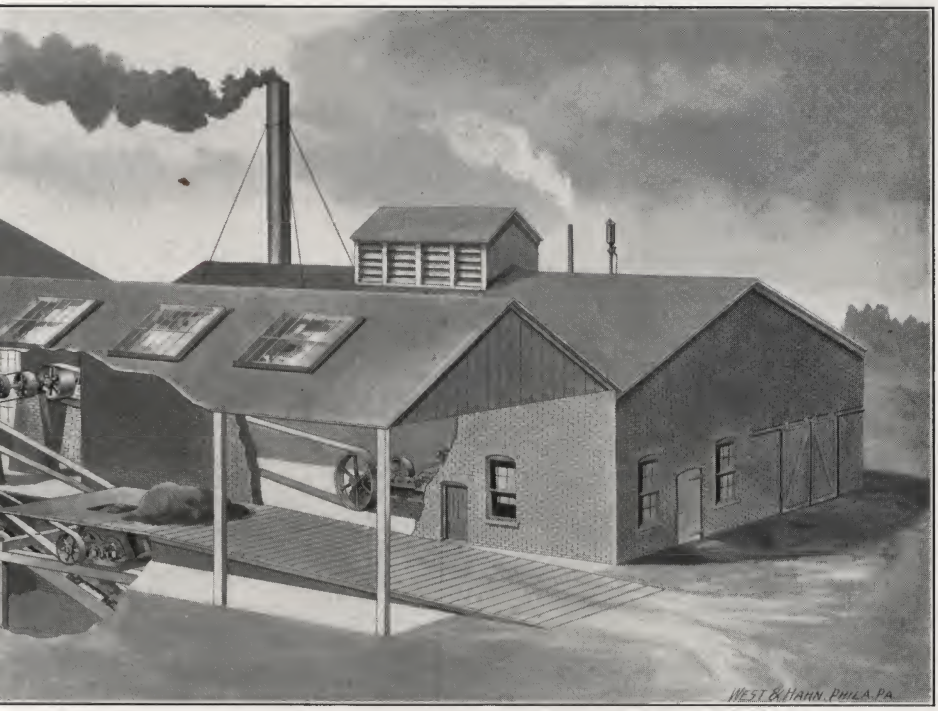
The automatic end-cutter with delivery belt (shown pages 15 to 18) is used with this machine. Weight of complete machine about 14,000 pounds. Length from outer edge of driving-pulley to end of 16-foot off-bearing frame is 49 feet. Width of floor-space occupied at rear end of machine is 6 feet 6 inches.



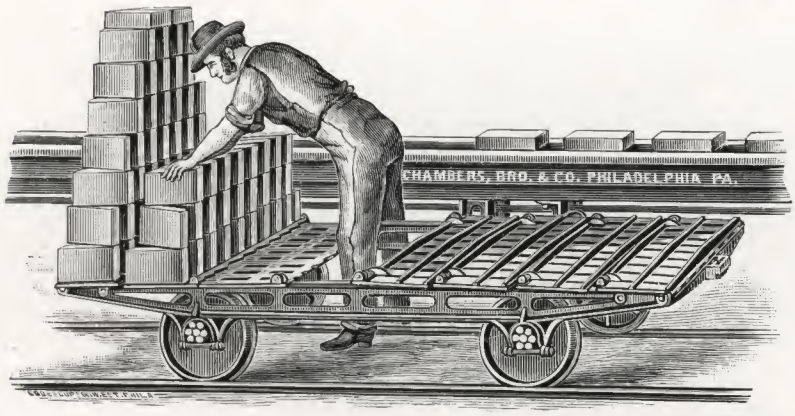
Illustrating the Chambers End-Cut Brick Machine with clay-belt elevator for feeding clay from the ground floor to hopper of machine. The bricks are removed on wheelbarrows and hacked from seven to nine bricks high under out-door drying sheds.



Typical arrangement of buildings and outfit for a brick plant working a surfa
20 size end-cut brick machine. The outfit includes clay disinte



ug plastic clay and employing either a number 10 or number
or, clay elevator, pug-mill, and brick machine.



Showing one method of hacking bricks from Chambers's machine on to platform cars for artificial drying.

The bricks may be moulded on Chambers's machine stiff enough to stand hacking from nine to eleven high, direct from the machine without damage.

Showing the hand method of "sanding heads" when making "stretcher bricks" on Chambers's improved machine.

See also the "Automatic Head Sander," shown on page 26.

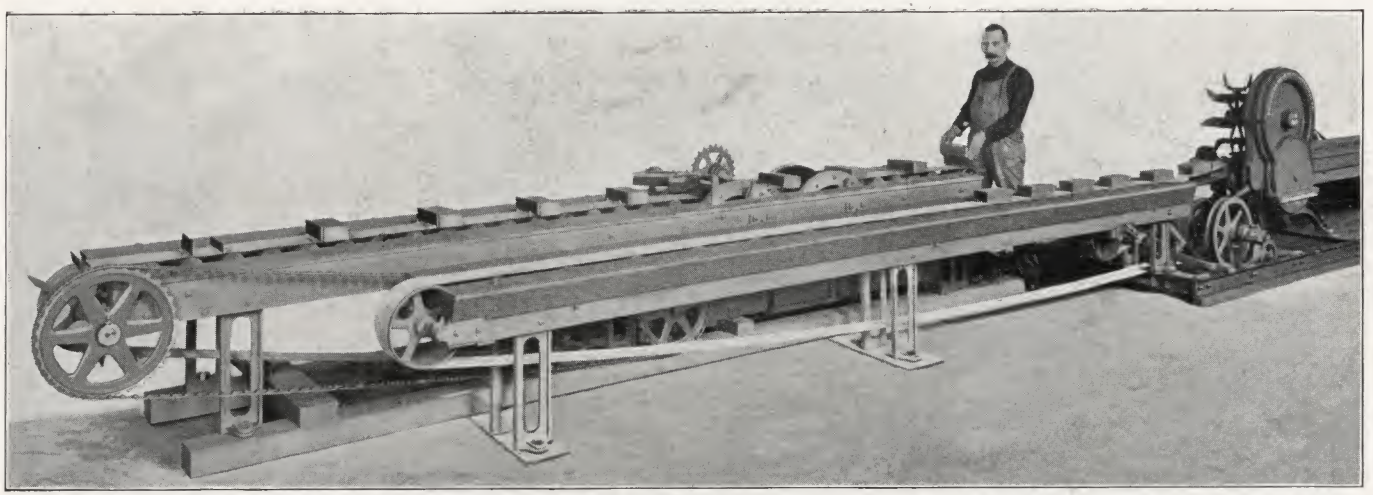
Office of ALEX. BURKE, Brick Manufacturer, Chicago, Ill.

MESSRS. CHAMBERS BROTHERS COMPANY, Philadelphia, Pa.:

Gents,—Yours of the 4th inst. at hand asking my views on your machine. I don't know whether mine is a "B" machine or not; but I do know one thing, and that is, there never was anything invented by human ingenuity better adapted for brickmaking. I expected a good deal of your machine, but it has exceeded my expectations. I could not do it justice.

Yours very respectfully,

ALEXANDER BURKE.

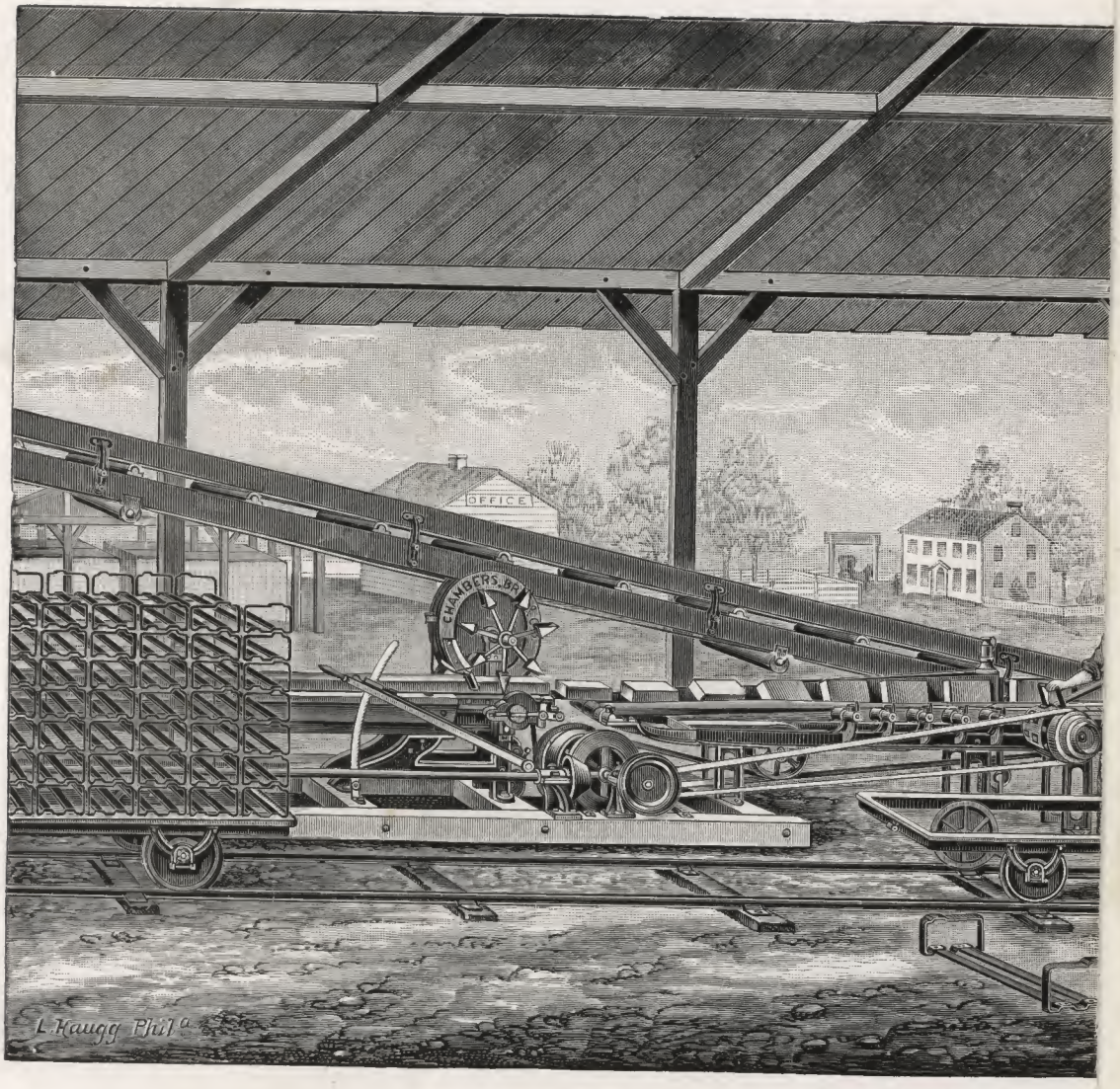


The Chambers Head Sander and Brusher in Position with the Brick Machine.

(Patented Oct. 11, 1898.)

The operator takes a position at the end of the Head Sander and close to the automatic cut-off, where he has an opportunity to select the bricks, and only transfers to the continually moving belt of the Head Sander bricks that are free from stone or other disfigurement. Head Sander occupies floor space of about 3 feet by 16 feet.

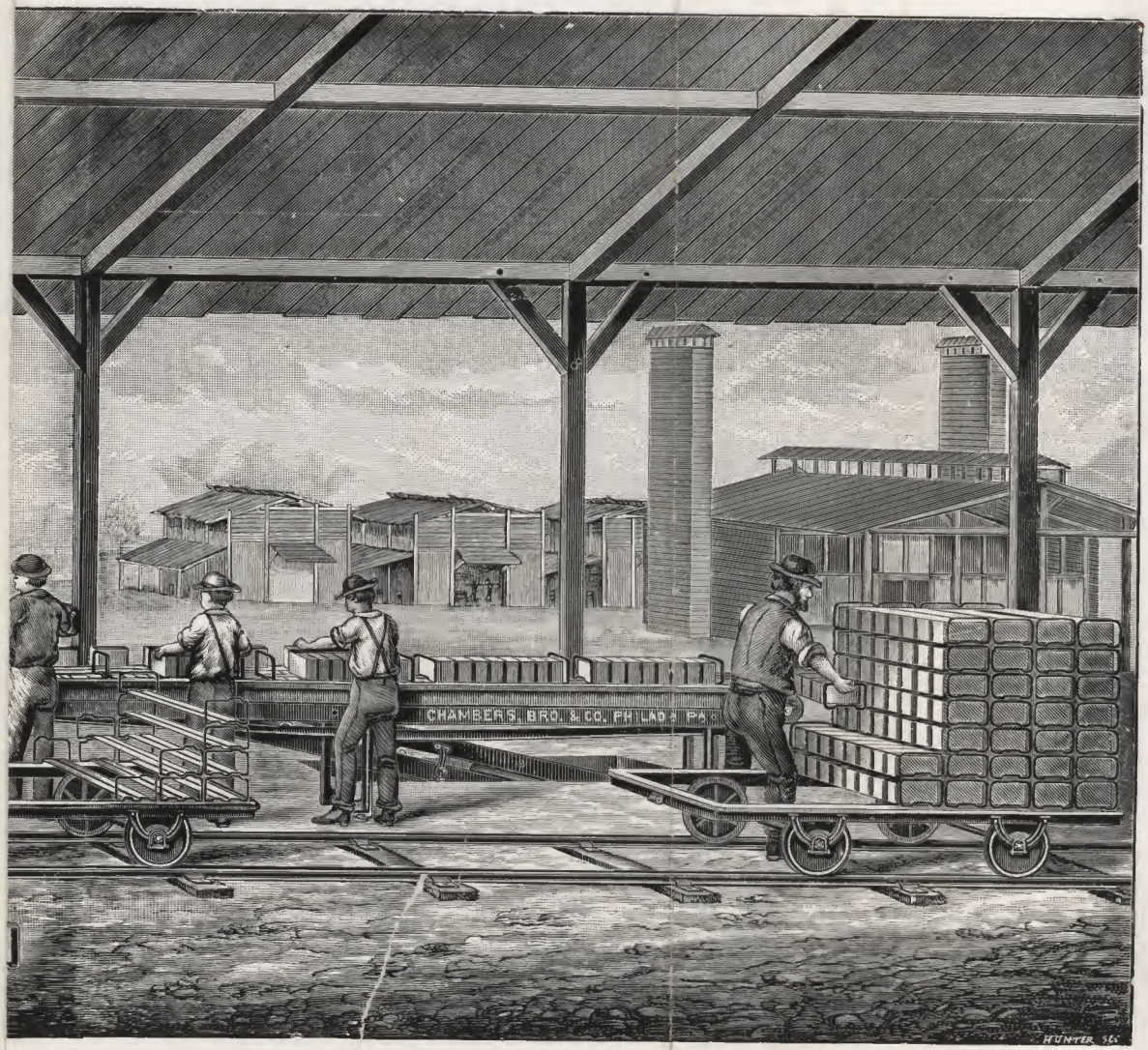
The angle-iron supporting pieces correspond in length with the bricks, and are secured to the belt. They thus form a guide and a rigid support for the brick while it is being carried by the belt between two pairs of revolving circular brushes. Dry sand in the box is kept constantly against the faces of these brushes, so that, as they revolve against the motion of the brick, they brush the sand into both heads of the brick. The action of the brushes at the same time smooths the heads. The result is a stiff-tempered end-cut brick with sanded faces and sanded heads, which burn the same color as the face. Sufficient room is given for off-bearing the bricks, and a little care in selecting and handling the bricks enables our customers to produce a very profitable grade of stretcher brick. The capacity of the Head-Sanding Machine is about twenty-five bricks per minute. It may be used to sand bricks that are intended for repressing.



The Chambers Brick

THE BRICK EDGER is an attachment, 5 feet 8 inches long, that matically turns the bricks on edge as they are being transferred to t will save the labor of one man.

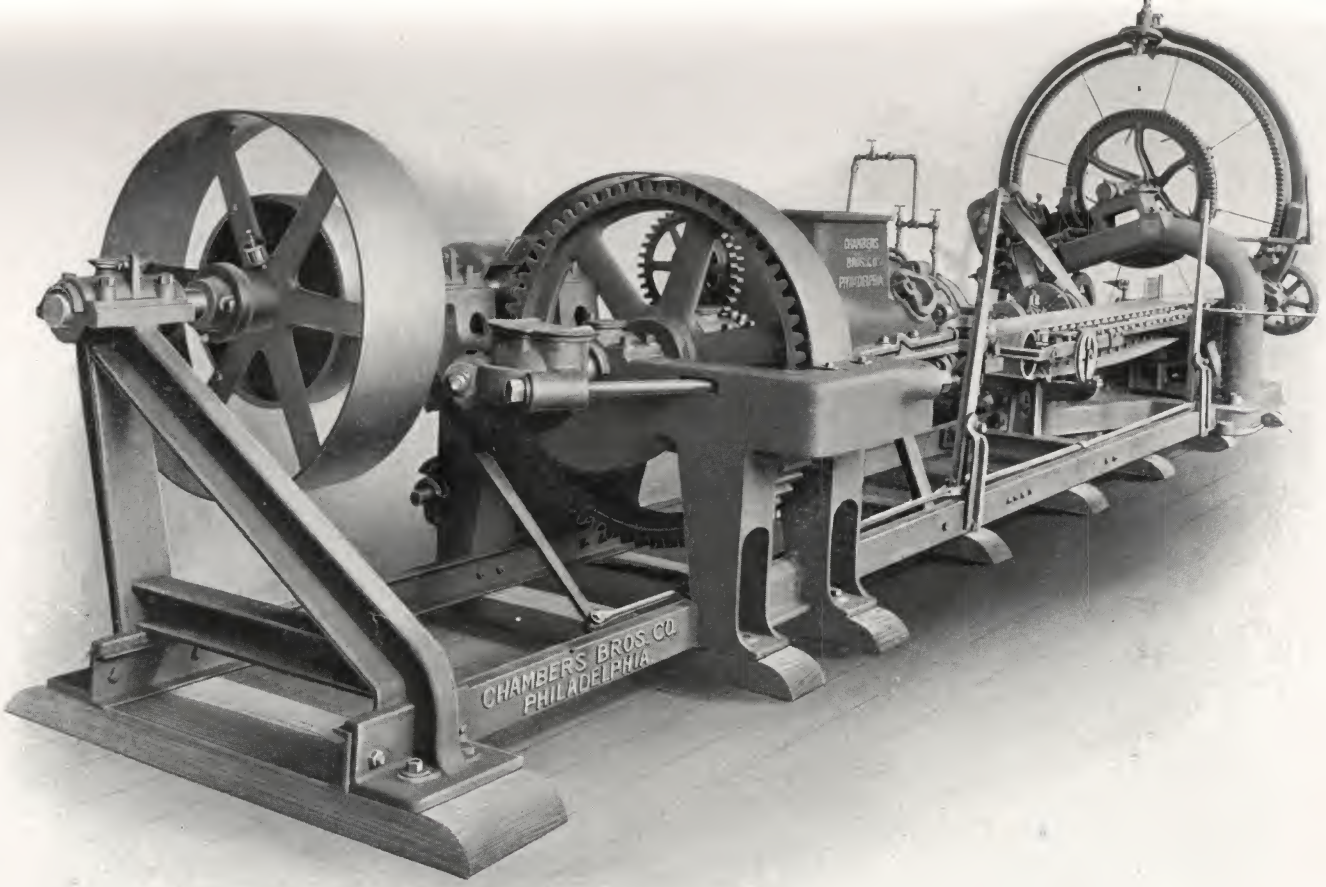
THE PALLET CARRIER is from 16 to 32 feet in length, and is to pallets, which may be of either wood or metal. If the clay worked another without marking, pallets each holding, say, eight bricks on e racks under sheds. A superior quality of brick is made by this met



Edger, also Pallet Carrier.

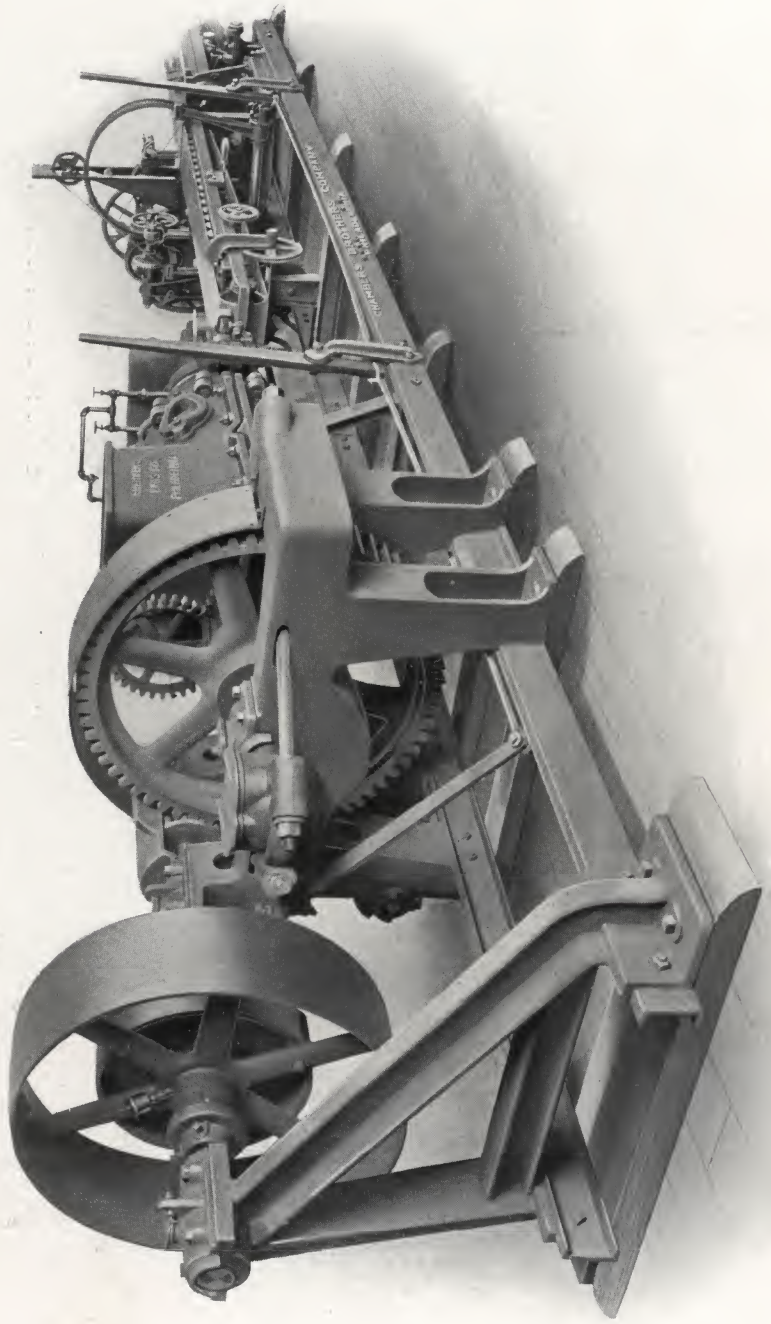
can be placed upon any of our machines making end-cut bricks. It auto-
ne off-bearing belt. On an output of 30,000 bricks per day, the Edger

a device to facilitate the transfer of the bricks from the off-bearing belt
is a little soft, so that the moulded bricks will not bear piling upon one
lge may be used, and the bricks dried in this position on cars or in
iod of handling and drying.



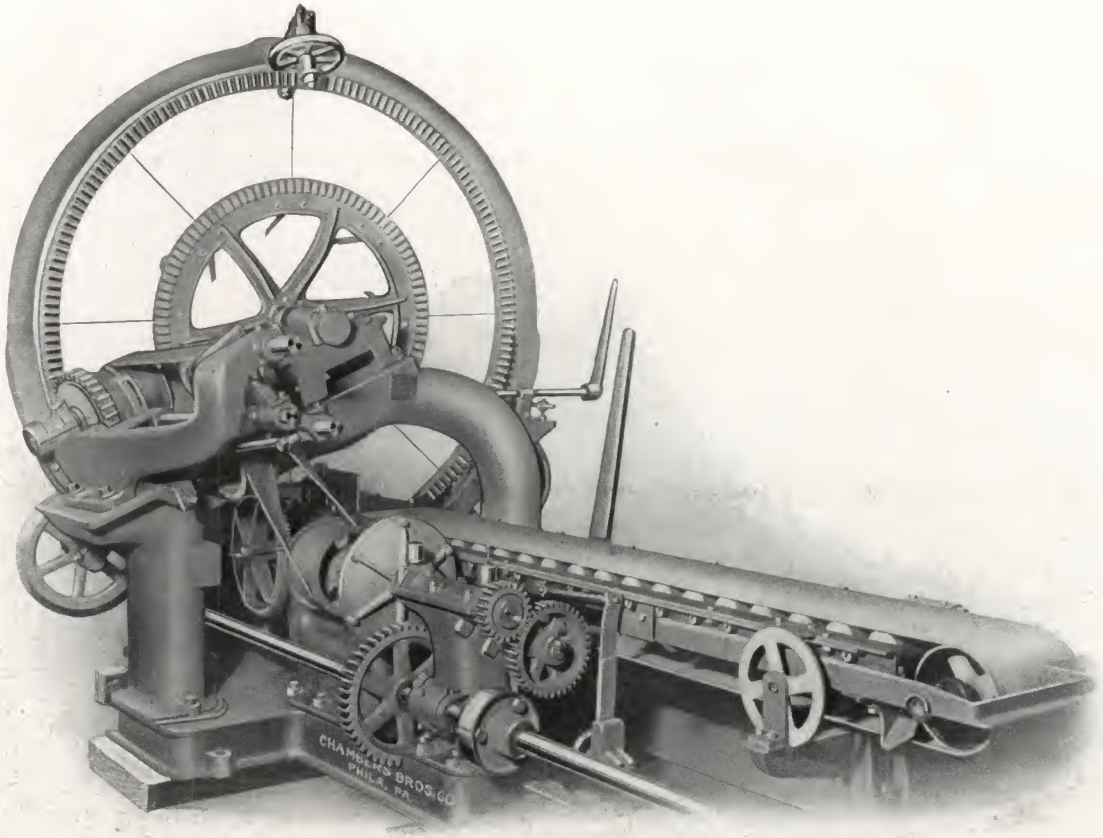
Showing No. 5 Automatic Side Cutter in Position on No. 10 Brick Machine.

Description of cutter pages 29 and 30.



The No. 10 Auger Brick Machine with No. 6 Automatic Side Cutter.

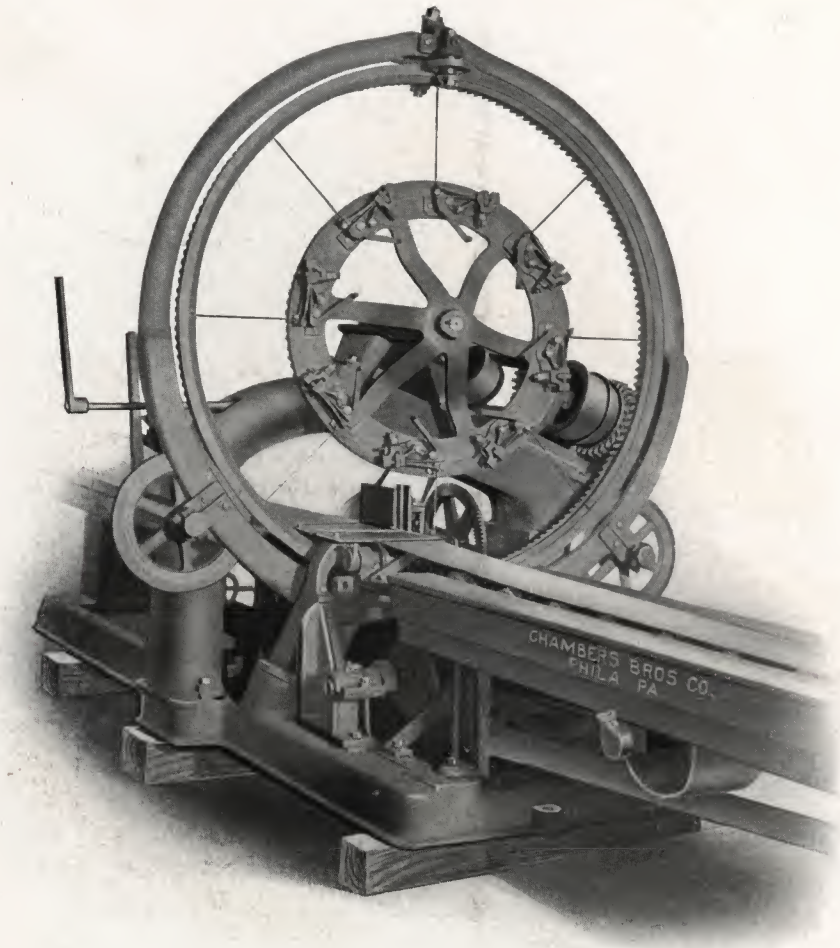
Capacity about 40,000 standard size building bricks daily.
Will form a clay bar as large as 6 x 12 inches. Adjustable for thickness from 2 to 4 inches.
Weight of complete machine, including cutter, about 14,200 pounds unboxed. Details of forming and expressing parts of machine, page 22, and of No. 6 side-cutter, pages 31 and 32.



The No. 5 Rotary Side Cutter, Showing Side Nearest the Die.

In the completed machine the spur gears are encased. Distance from face of Die to cutting wire is 12 feet 6 inches. Height from ground line to top of cutter 8 feet 6 inches, width at widest point 7 feet 3 inches. Weight, including one 16-foot length of delivery frame, about 9000 pounds.

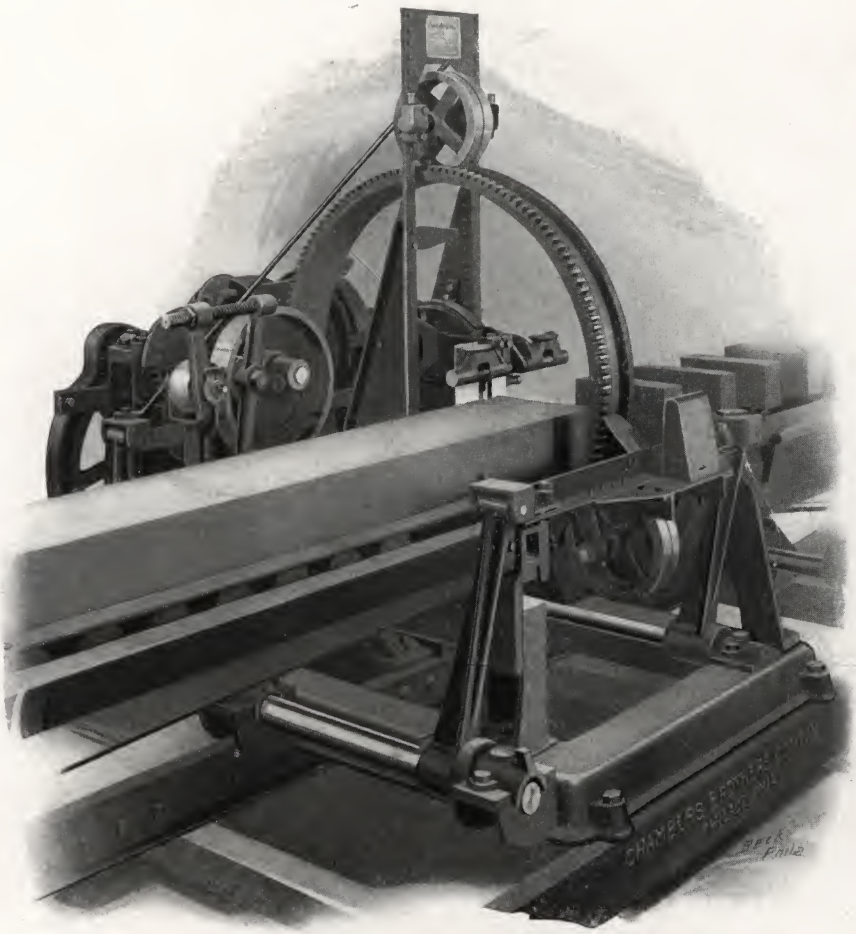
The driving shaft of this cutter should make 82 R. P. M. for 10,000 bricks per hour; or 89 R. P. M. for an output of 12,000 per hour. If the cutter shaft is to be driven by other means than connection with a Chambers Brick Machine, a pulley 20 inches diameter by 6 inches face may be used.



The No. 5 Rotary Side Cutter, Showing Brick Delivery Side.

This is an 8 wire cutter in which the rings carrying the wires are driven by rawhide pinions engaging in cast-iron gears. It is the logical development of a similar 6 wire cutter that we have manufactured for some time and practically overcomes the deficiencies of the previous pattern. The wire is relieved of all strain save that of passing through the clay. The frictional regulation of cutter speed is obtained by an encased cone friction instead of the slipping belt and is so accurate that a very slight pressure from the clay bar is quite sufficient. We thus avoid any possible swelling of the clay bar as well as any slippage of belt with the attendant variation in thickness of bricks.

Provision is made for stones or foreign substances in the clay. The cutter can be instantly stopped by means of a brake without stopping the brick machine itself. It is a most satisfactory high speed cutter, cutting one brick at a time only. It will cut a section as large as 6 x 12 inches or 7½ x 7½ inches with a large range in thickness. Changes in thickness are readily accomplished without serious expense.



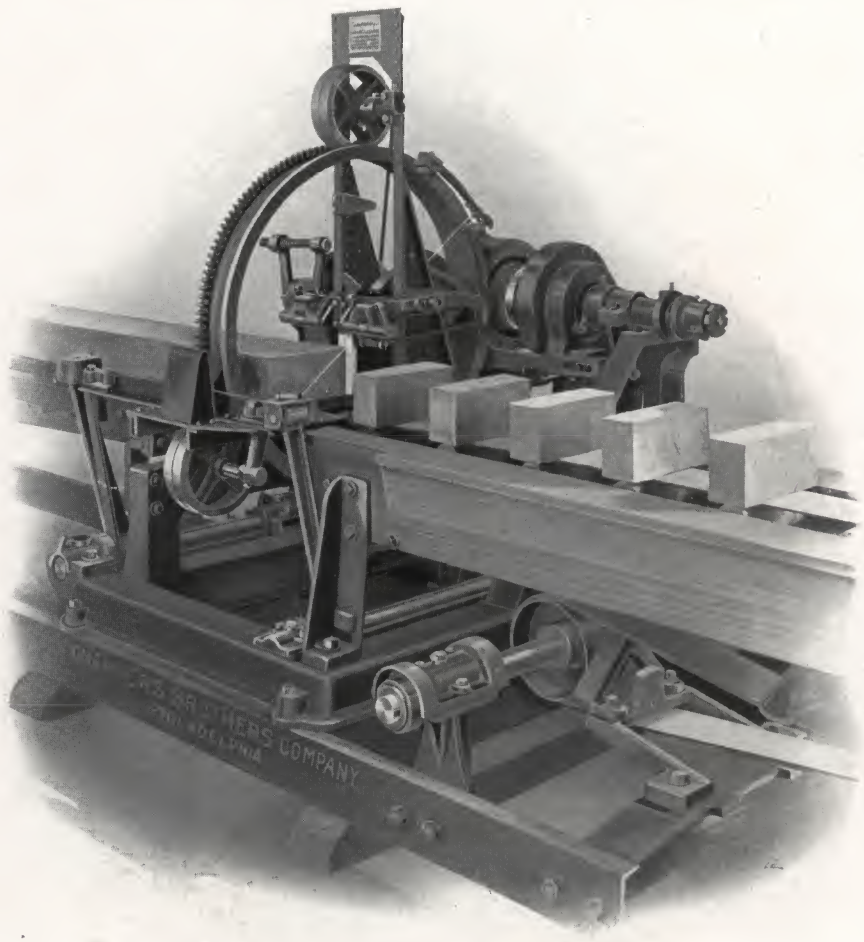
The No. 6 Automatic Side Cutter, Showing Side Nearest the Die.

This is a single wire rotary side cutter that has already been tested to a speed of considerably over 100 bricks per minute and is therefore perfectly reliable for our guarantee of 40,000 bricks daily capacity, or less. It does not however have the capacity of our No. 5 cutter.

The No. 6 is of simple construction, inexpensive to maintain, has a shear down cut producing smooth face bricks, absolutely square and of uniform thickness.

Provision is made for the escape of stones, should they be in the path of the cutting wire. The flexibility of the wire does not affect the squareness of the cut.

The largest section it will cut is 6 x 12 inches with a range in thickness from 2 inches to 4 inches in gradations of $^1/_{16}$ inch.



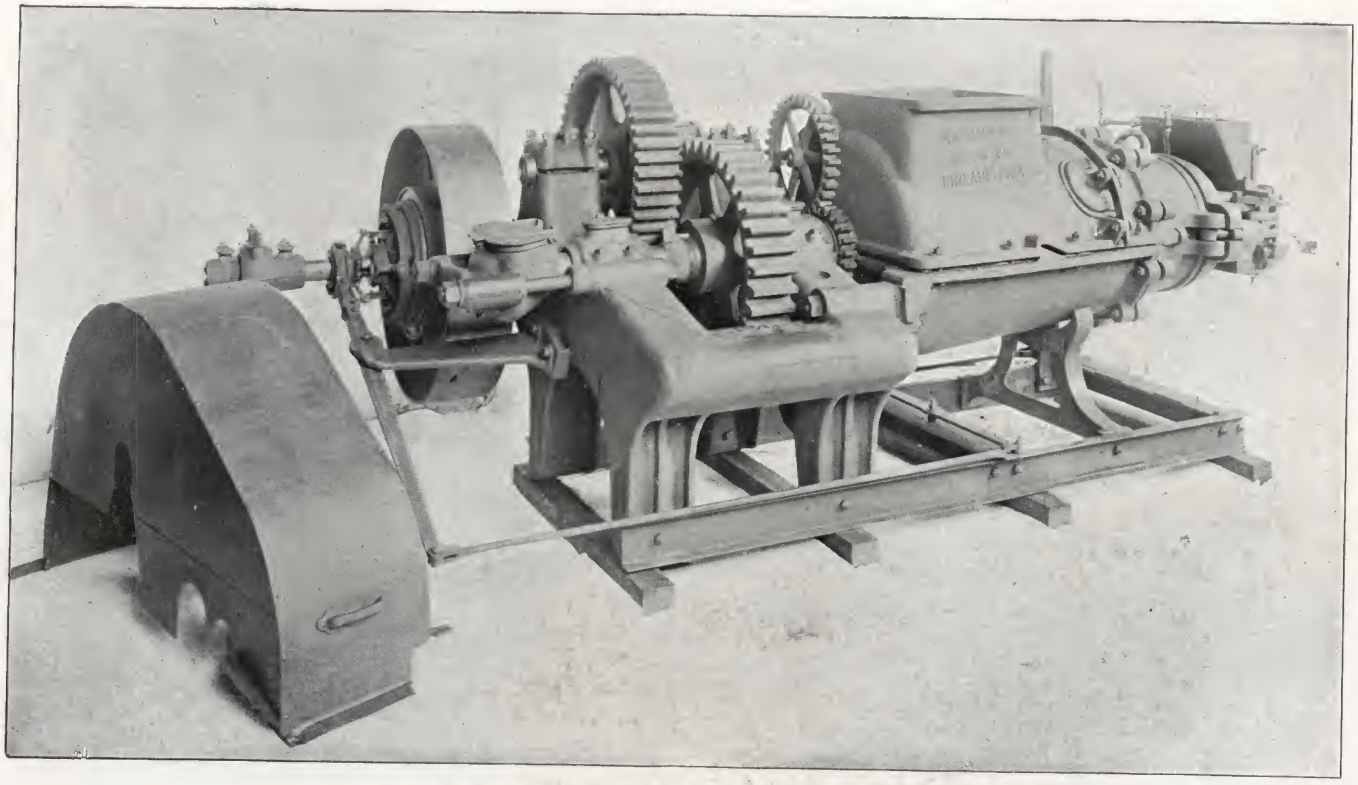
Rear View of No. 6 Side Cutter.

The bar of clay is carried from die to the cutter by means of a carrying belt, and the dead surface over which the clay must slide at the cutter is reduced to a minimum, being only the thickness of about two bricks. The wire passes through a steel slit plate, the width of the opening being only about $^1/_{16}$ inch.

The revolving ring, together with the slit plates, has a slight oscillating motion and moves forward during the passage of the wire through the clay, returning to its original position before the next cut is commenced. The extent of oscillating movement required is surprisingly slight, and the mechanism by which this is secured has been worked out so nicely that the motion is smooth, quiet and without injury to the machinery.

The speed of the cutter is under the control of a cone friction, governed by the clay bar itself.

This cutter can be adjusted to cut bricks varying in thickness from 2 to 4 inches in gradations of $^1/_{16}$ inch. The parts required for each thickness are easily changed and comparatively inexpensive.

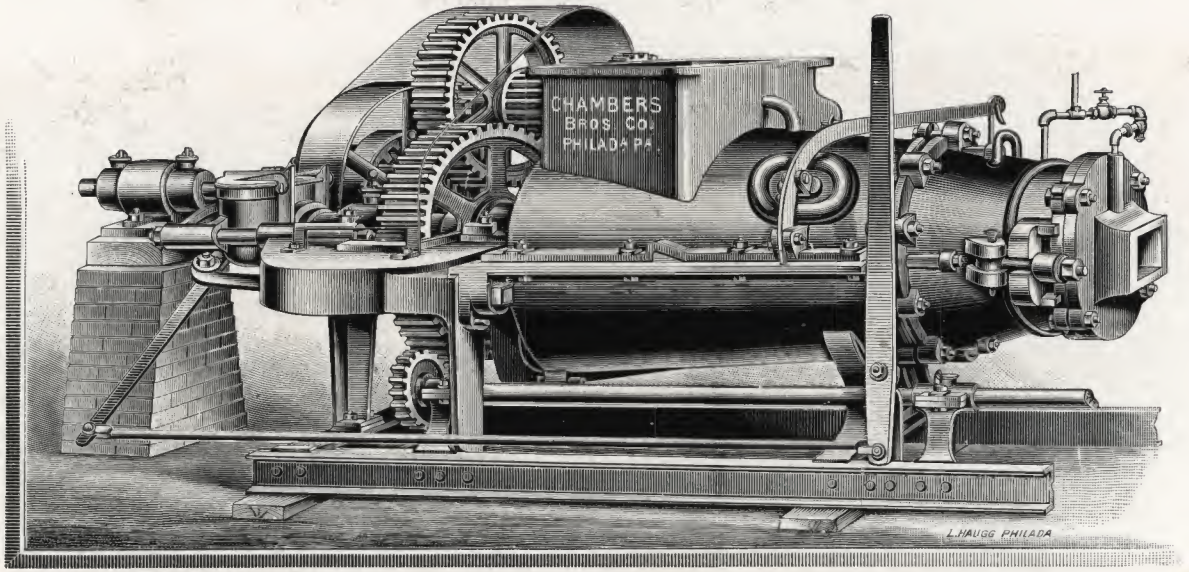


The Chambers Side-Cut Brick Machine, No. 6.

This illustrates our Side-Cut Brick Machine of 35,000 per day capacity when fitted with lubricating die and automatic sander, which coats the issuing clay-bar with sand for the production of sand-faced stretcher or stock bricks.

The machine may be used without the automatic sander when desired. The general framing and dimensions of parts are the same as given for End-Cut Machine, No. 5.

Machine No. 10, page 28, is recommended as a better and more modern design for about this capacity.



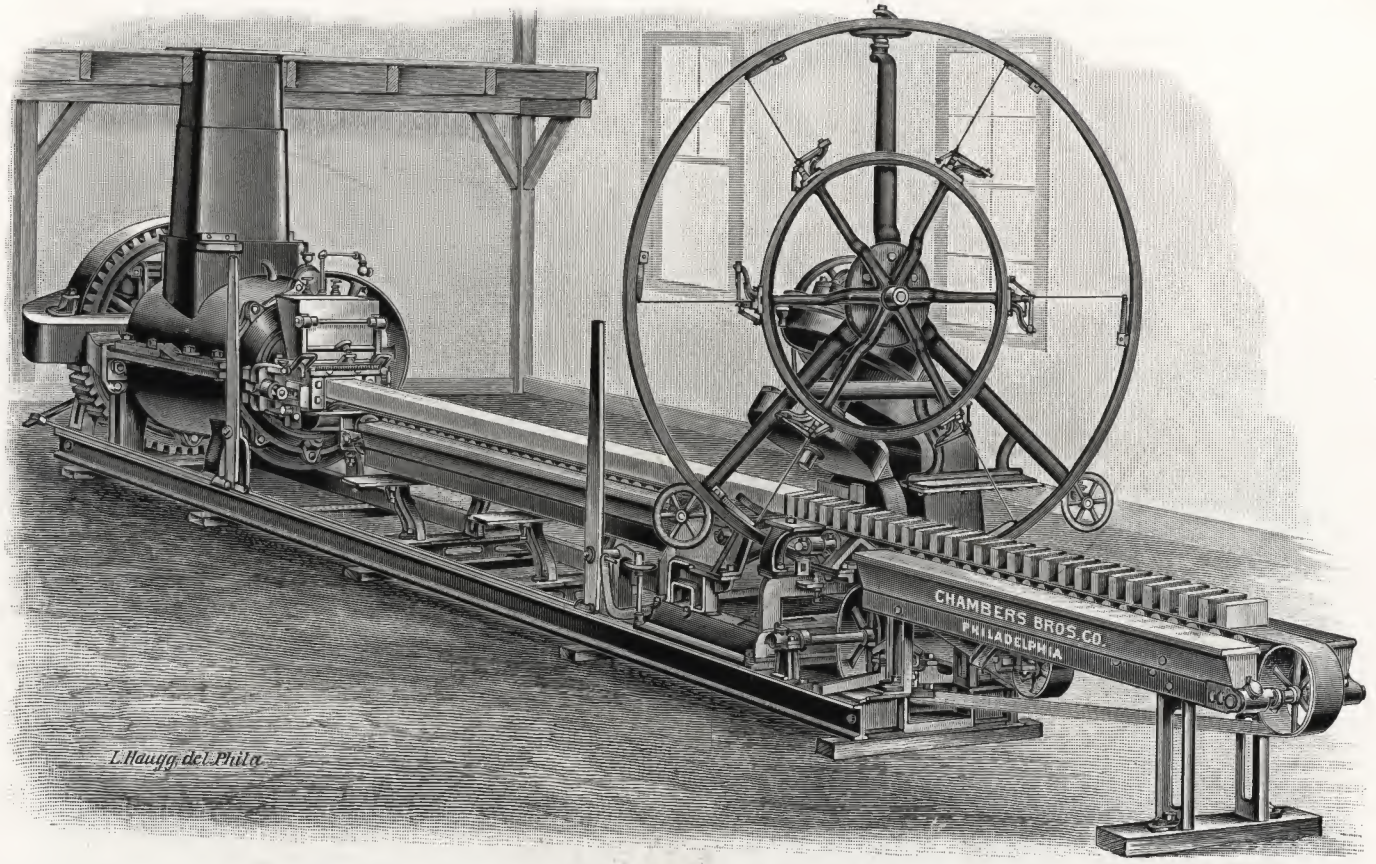
The Chambers No. 4 size Brick Machine, with Side-Cut Brick Die.

GUARANTEED CAPACITY, 25,000 BRICKS PER DAY.

This machine may also be constructed with the End-Cut Brick Die, Automatic Sander, and Automatic End-Cut Table, shown on page 15.

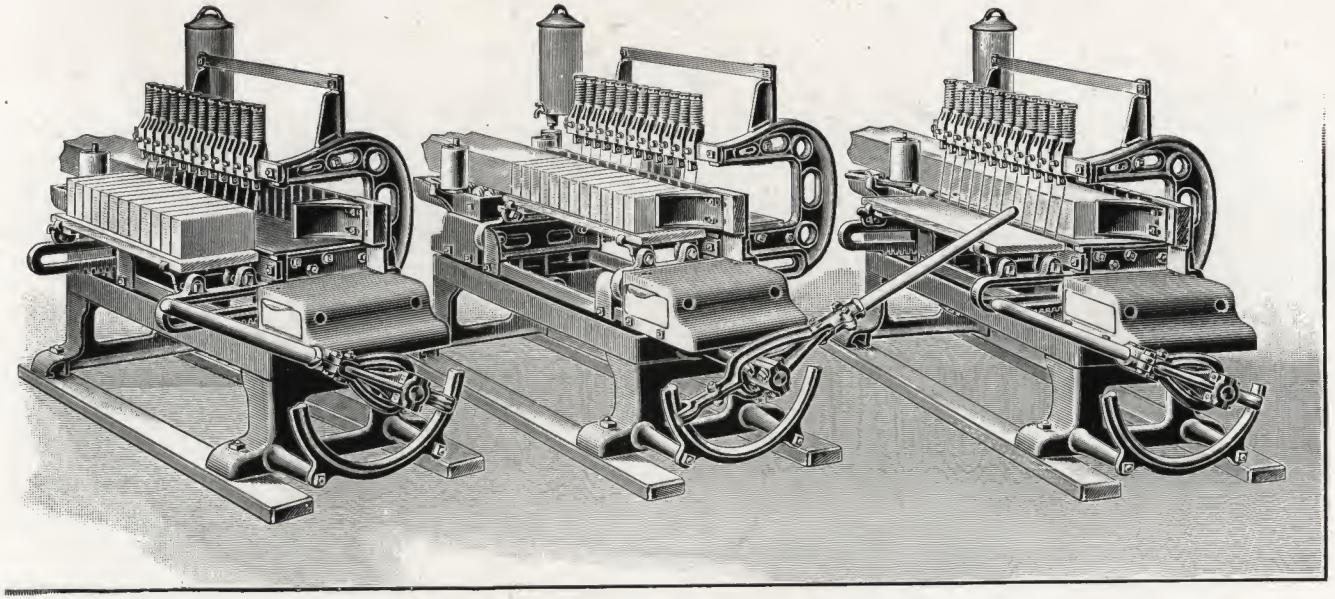
It is mounted on an iron frame of 4-inch channels, has friction-clutch driving-pulley 30 inches diameter by 7 inches face, and steel pinions.

Length from outer end of driving-shaft to face of die, 12 feet.



The Chambers Automatic Side-Cut Brick Machine, No. 8.

Capacity from 50,000 daily upward to 200 bricks per minute, under favorable conditions.
Bricks are automatically sanded on all faces. Weight, including cutter, unboxed, 24,500 pounds.
For detailed description of tempering and expressing parts of this machine, see insert facing page 15.
For detailed description of automatic cutter, see pages 29 and 30. The improved cutter has 8 wires.



Board Delivery Cutting Table.

This table is easily operated and cuts twelve bricks at a time, drawing a smooth board under the bricks as they are cut. The upper portion of the table travels forward upon a track while the wires are being drawn through the column of clay, thus compensating for its forward motion. A slight pressure on the lever during its return stroke brings the table to its original position and places the board loaded with bricks ready for removal. Weight, about 900 pounds, unboxed. Length, including hand lever in operating position, about nine feet. A modification of this table is furnished for cutting chimney blocks and hollow ware of large section.

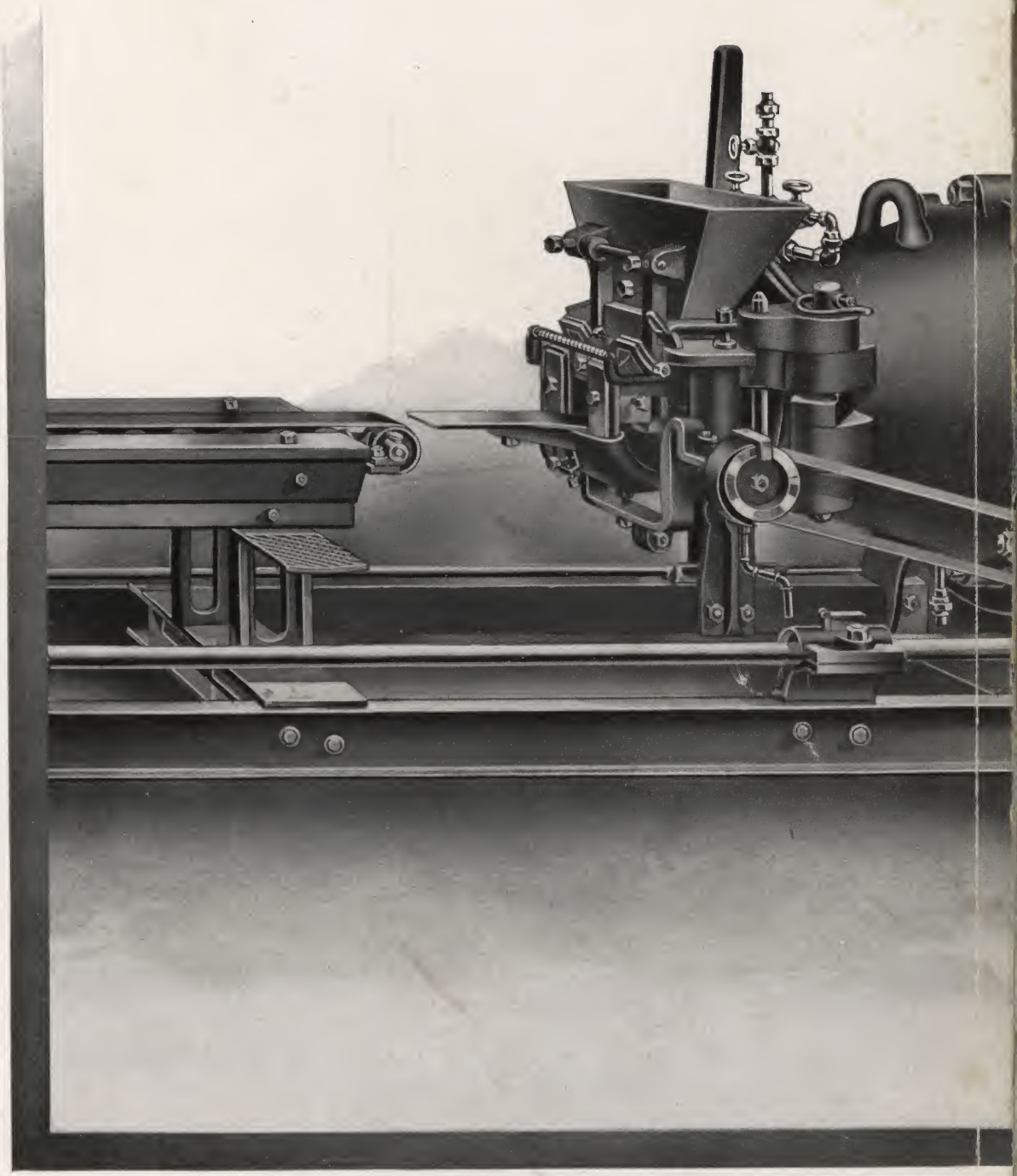


Illustration of the large heavy pattern CHAMBERS AUGER
steel driving gears fo

CHAMBERS BROTHERS COM

The Manufacture of Bricks for Streets and Roadways.

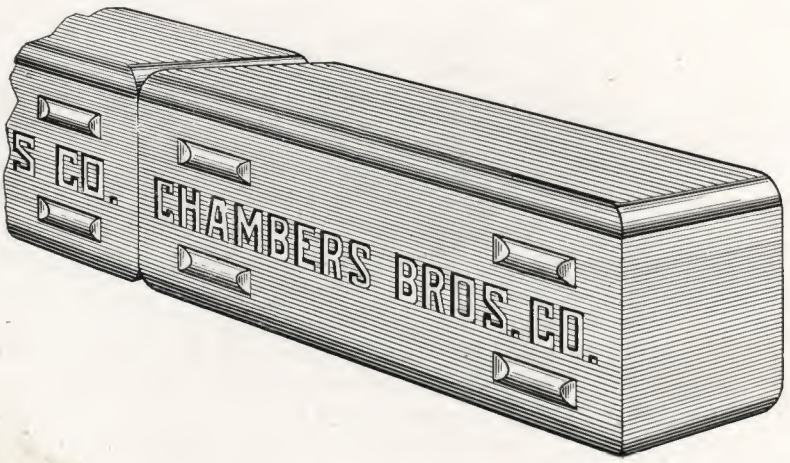
In a paper read before the first American Congress of Road Builders, Mr. George W. Kummer describes the primary elements of a "Vitrified Brick" as: First, a suitable clay, a mineralized clay, one possessing annealing qualities. Second, the sufficient grinding of this material and its *proper formation in the green state,* as absolutely essential for the production of a good paver, which he preferably designates not as vitrified but as an ANNEALED BRICK.

During the processes of proper manufacture the constituent elements of such a clay are converted into new forms and the finished brick is a homogeneous mass, free from lime as an active element, and is annealed with every clay particle bonded. This very excellent description of the finished article is in harmony with the requirement of engineering practice which stipulates that a street paver must not absorb over a given percentage of water within a specified time, nor lose more than a certain percentage of its weight when subjected to an abrasion test under established conditions; that it must, in short, possess not only transverse strength, but the quality of resistance to the ravages of impact, abrasion, and absorption.

With this end in view, is it not a logical conclusion that a manufacturing process molding a paving brick to the required shape at one operation, with the constituent particles intimately bonded with the greatest amount of material per cubic inch of contents, and then leaving such a brick to be dried and burned without further mechanical disturbance of its structure, is *the method* productive of the best paver? The Chambers End-cut Auger Brick Machine with Automatic Indenting or Round Corner Cutter produces precisely this result.

The alternative process of molding a green brick to approximate shape, placing it in a press box and squeezing it between two plunger plates in order to change its shape, is commonly termed the Repress Method. That the term is erroneous is evidenced by the fact that Repressed Paving Block are *expanded in bulk* by repressing and have from 3 to 4 cubic inches greater measurement after repressing than before. The ill effects of this expansion of bulk is immediately shown by the fact that certain repressed Paving Block suffered from 4 to 5 points greater loss during the rattler test than End-cut Block not repressed, made from the same shale, on the same plant, and burned in the same kilns.

The End-cut Machine is pre-eminently the one for this method of manufacture, because it not only molds a block of greater density than Side-cut Machines, but for the reason that the end-cut block possesses a structural formation that is in itself an element of strength and of resistance to wear.



The Round Corner Paving Block

with spacing lugs

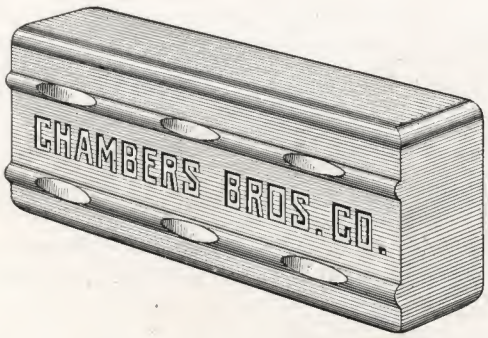
Made without Repressing.

The Automatic Indenting Cutter, in connection with a round-cornered die on the Chambers End-Cut Brick Machine, produces a round-edge paving brick or block, either with or without longitudinal grooves for the reception of binding material, and leaves the structure of the brick just as made by the machine, in itself an element of strength.

The corners of the die may be formed of any radius from $^1/_{16}$ to $^3/_8$ inch. Spacing lugs are formed on the block by so shaping the die as to mold one or more projecting ribs upon the upper surface of the clay bar and then automatically producing such openings or channels in these ribs as desirable for the free flow of the binder used in laying the pavement.

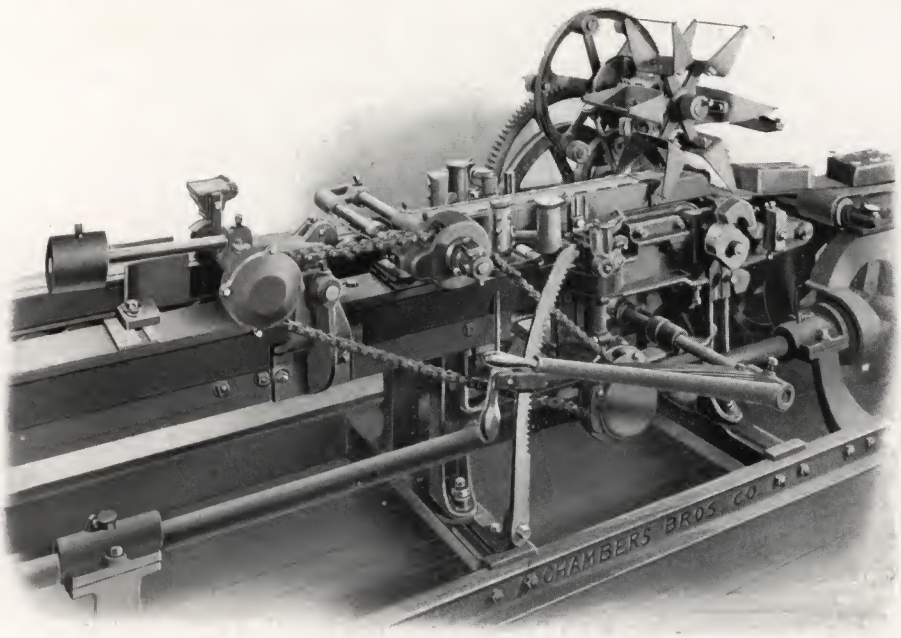
This improvement is the outgrowth of an invention made at the works of the Springfield Paving Brick Co., in Illinois, developed and improved by us, and embodied in a special pattern of our Automatic End-Cutter, designed especially for paving blocks or bricks.

The indented bricks are free from fins resulting from worn press boxes, are stronger, and the manufacturer avoids the investment in represses in addition to saving the labor of repressing, together with the expense of press repairs.



Our Round Corner Dies will produce a round-edge paving brick or block with surfaces plain, grooved, or with one or more projecting beads.

An attachment to this cutter can be made to stamp a name or trade mark upon each brick and to cut cement channels as shown in the projecting beads.



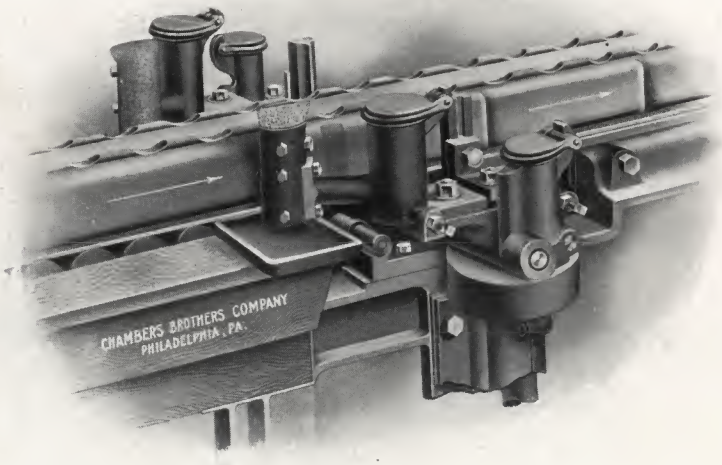
The Automatic Indenting Brick Cutter (Patented).

(Three U. S. patents issued and additional applications pending.)

Purchased by the Springfield Paving Brick Co., Springfield, Illinois; The Sangamo Brick Co., Springfield, Illinois; the Southern Clay Manufacturing Co., Coaldale, Alabama; the Hydraulic Press Brick Co., St. Louis, Missouri; the St. Louis Clay Burning Co., Clayburn, Missouri; the Hydraulic Press Brick Co., Kansas City, Missouri; Montello Brick Works, Reading, Pa.; Kaaterskill Paving Brick Co., Catskill, New York; Hydraulic Brick Co.,

Louisville, Kentucky; the Purington Paving Brick Co., Galesburg, Illinois; Topeka Vitrified Brick & Tile Co., Topeka, Kansas; the Flint Brick & Coal Co., Des Moines, Iowa; Thurber Brick Co., Thurber, Texas; Simons Brick Co., Los Angeles, Cal.; Los Angeles Pressed Brick Co., Los Angeles, Cal.; New York Brick & Paving Co., Syracuse, New York; Barber Asphalt Paving Co., Des Moines, Iowa.

One difficulty experienced with the earlier cutters of this pattern came from the clay sticking to the indentor steels. A new device for automatically oiling at every indentation, and also for oiling the stamping rollers, entirely obviates the previous trouble.



(Patented Dec. 28, 1909. Other patents applied for.)

The cutting mechanism itself is much the same as employed in our regular pattern No. 8 Automatic End-Cutter.

Our improved method of preventing the clay from sticking to the indentor steels is to oil the side faces of the clay bar just previous to every indentation.

Mounted upon each crank disc giving motion to the indenting steel but located just one brick length in front of the steel is an oiling pad faced with a semi-porous material. The oil flows to this pad by gravity from a small oil reservoir which is part of the same casting. With every revolution of the crank discs these oil pads are brought in contact with the sides of the clay bar in the position where the indenting steels will strike upon the next succeeding revolution of the disc. The steels thus keep free from clay and a smooth round corner is formed at the line of severance next made by the cutting wire. The quantity of oil used in this way is insignificant. This oiling device is the subject of an application for letters patent.

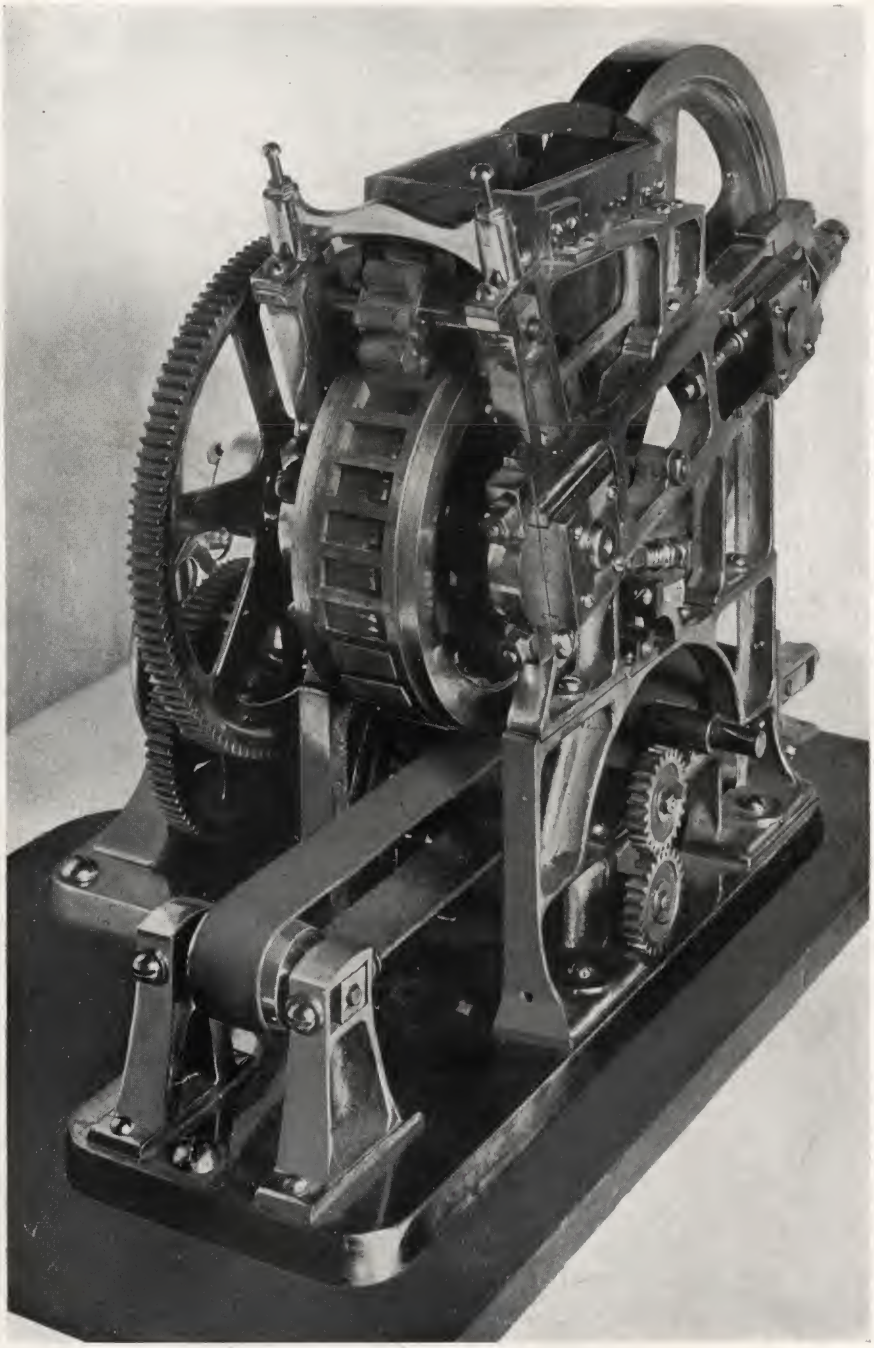
"The Big Wheel" Brick Machine.

We have recently purchased the Joseph Walker patents for improvements on the Mould Wheel Brick Making Machine so long in use in Washington, D. C., and commonly known as "The Big Wheel Machine." To these patents will be added such improvements as dictated by our own experience in clay working machinery.

Fully realizing that the principles involved in the wheel machine limit its use to clays possessing certain peculiarities, and that it has not been generally used excepting in the city of Washington, D. C., and vicinity, we are preparing to build the machine for use under approved conditions.

We already build and have supplied much of the clay preparing machinery used in connection with The Wheel Brick Machine, and of great value in securing its best product.

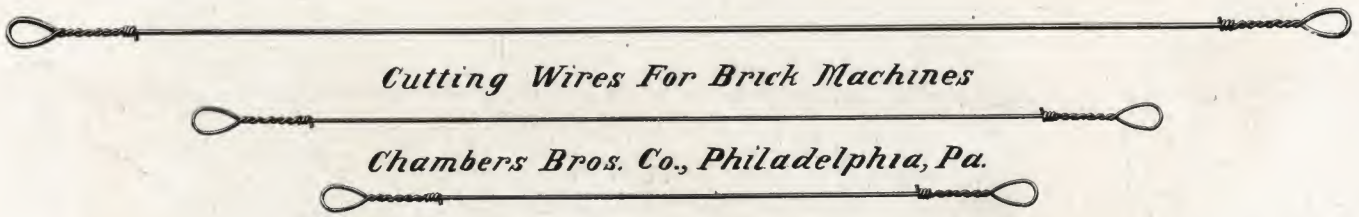
Correspondence Solicited.



Reproduction from Model of

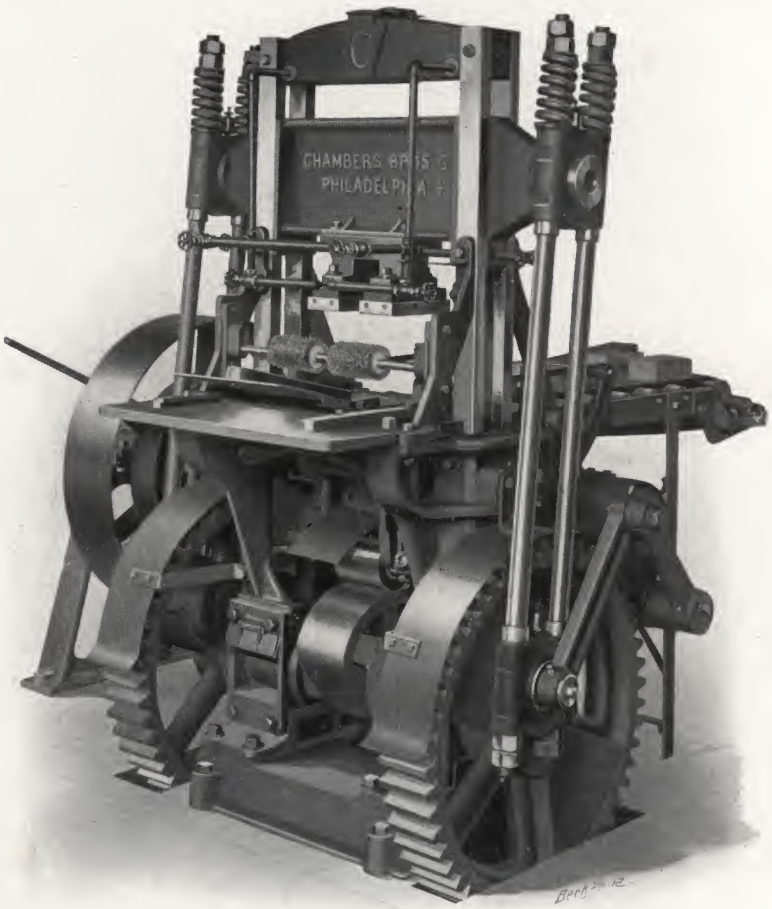
THE WHEEL BRICK MACHINE

Uniform Wires---Loops Double Twisted---Wires Straight---Ready for Use.



We have devoted particular attention to the manufacture of wires for our cutters, and endeavor to supply our customers with ready-made wires that are not only of the best material, of uniform temper, but also in condition for instant application, thus avoiding all possible loss of time. Our wires are straightened, double-twisted, uniform in length and in size of loop. There is no economy in having a brick machine stand idle while the operator " fusses around " with a crooked home-made wire that is too long or too short. Special wires made to order.

THE C LINE

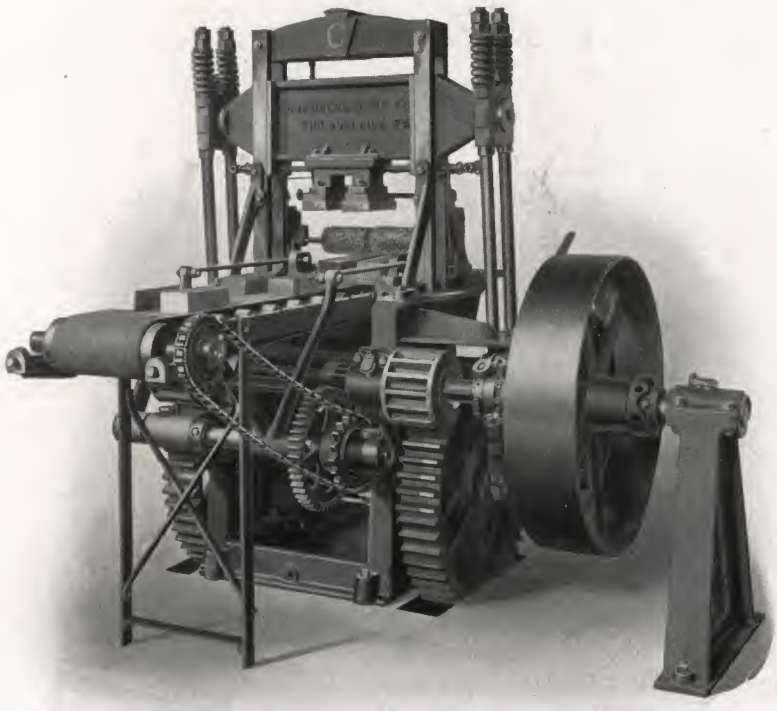


Keystone Crank Repress

The Keystone Repress.

The Keystone is a strongly-built Press of the pattern employing direct crank movement, and is so constructed that a separate and distinct pressure is applied to the lower side of the brick. This is secured through the use of a hardened steel-faced cam in contact with a cam roller 5½ inches diameter connected with the lower cross-head and causing the lower plungers to move upwards through the press-box in proper time with the stroke of the double cranks giving downward motion to the upper plungers.

Recognizing the importance of stiffness and great strength as factors in securing the full benefit of these movements on its finished product, the



Press has been closely built in addition to making all working parts of large diameters. The distance between connecting rods is only 46½ inches and the crank shaft itself $5^{5}/_{16}$ inches diameter. These dimensions, in connection with similar proportions of other parts, result in a Repress of enormous strength, particularly suited for the PAVING BRICK TRADE, for which this machine has been especially designed.

The *bore* of our cam roller is $2^{7}/_{16}$ inches, thus securing the use of a pin of large wearing surface, a very important point in reducing wear on

these parts. This pin is secured to the cross-head in a very simple manner and is so accessible that both pin and roller may be easily and quickly removed without dismantling the Repress in any way.

The lower cross-head slides are long and wide, with most excellent provision for oiling. The close distance between the connecting rods on the Keystone adds very greatly to the strength of its upper cross-head as compared with one of similar section but of greater length. Metal shields cover the gears and pinions, and the cam and its roller are protected against falling dirt.

The mechanism for moving the charger feeding and delivering the brick on the Keystone has been most carefully and successfully planned. It is in perfect time with the pressing movements, places the incoming clot exactly where wanted and delivers the finished brick or block upon the carrying belt with a smooth, easy motion without mutilation. The charger motion is derived directly from one of the cranks extended to receive a connecting rod. The other end of this rod connects with an arm secured to a rock shaft journalled in both side frames of the Repress. The location of this rock shaft relative to the crank shaft is such as gives a perfect timing of the charger relative to the plunger movements. There is mounted upon the rock shaft a bifurcated arm, and from the extremities of both branches of this arm connecting rods reach to the charger.

The anvil blocks for upper plunger plates are fitted for steam connection.

The cross-rail at the top of guide-bars is a chambered casting provided with a self-closing lid and serving as a receptacle for oil that may be used to lubricate the brick. The chamber is large enough to hold several gallons and makes a neat dirt-tight reservoir with separate feed pipes from either end.

Either of two styles of feed table will be supplied. The illustration shows the style recommended, consisting of an inclined steel plate secured to and moving with the charger. The brick slide easily down this inclined surface into the charger and the mechanism is free from traps liable to catch a man's fingers, so common on stationary tables with charger moving beneath. In connection with this style of feed table the press foundation is made such height as brings the inclined feed plate at a convenient position.

The main bed-plate casting is chambered and shaped to gather the oil dripping from the press-box.

Range of Sizes.

In this particular the Keystone has been made to cover the requirements of the average run of repress work rather than sacrifice anything in its convenience, strength and durability in order to include some occasional and very unusual size.

THE KEYSTONE STANDARD will deliver two finished brick or block of thickness ranging from 1½ to 4⅛ inches.

The width may vary from 3½ to 5½ inches and length from 8 to 11 inches.

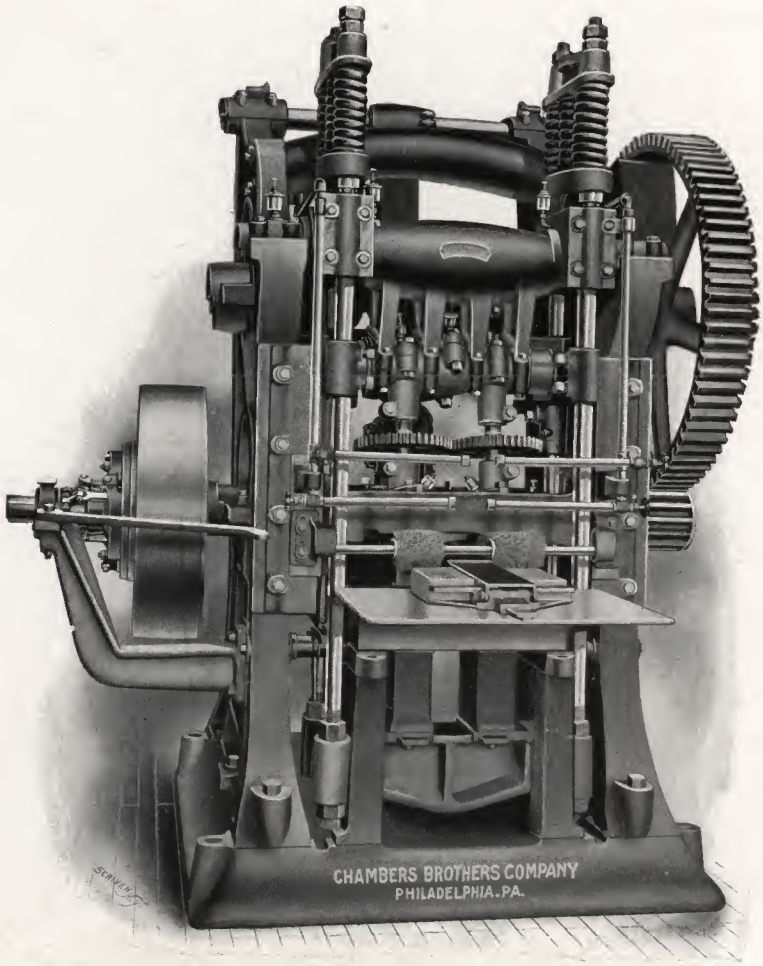
The Press may be fitted to deliver a single block up to 13-inch width and 11-inch length by 4⅛-inch thickness.

The Keystone Special can be made to deliver two finished block as large as 14½ x 6½ x 4 inches.

Friction clutch pulley 36 inches diameter by 8½ inches face. Speed, 59 to 93 revolutions, giving 16 to 25 strokes per minute according to the quality of product desired.

Width of Press, including outboard bearing for driving shaft and all projections, 7 feet 8 inches. Length of floor space, including standard length of delivery belt, 8 feet 7 inches. Unboxed weight, about 7,500 pounds.

Brick Represses.



The Philadelphia Repress, No. 2.

In this Repress we offer the trade a machine that we believe will find a place with experienced users of this class of stiff tempered brickmaking machinery.

It is a two-mold crank press, with the operating machinery above the mold-box, where dirt and clay cannot drop into it.

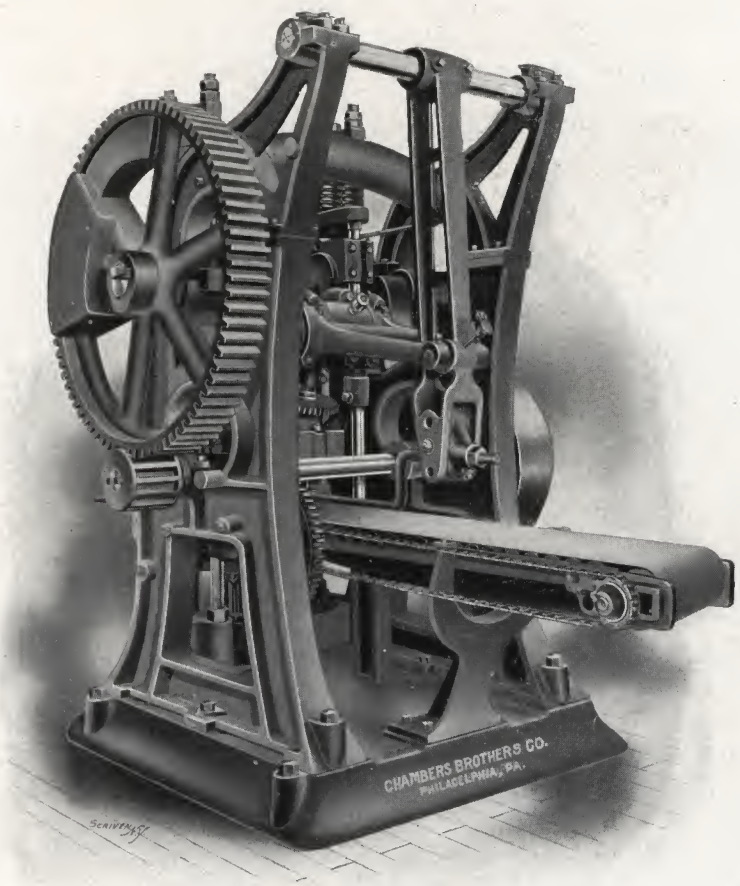
All of the operations are derived from a single crank movement, resulting in an extremely smooth, easy running machine, making comparatively little noise and working without abrupt jerky motions.

The whole Press is mounted upon a substantial box pattern iron bed plate, having planed faces to which the side frames are bolted. These are of sub-

stantial design, ample to carry the working machinery. All shafts are of liberal size mounted in babbitted bearings made with removable caps machined and carefully fitted to place.

The toggle pin is $2^{15}/_{16}$ diameter, rigidly secured in the upper toggle arm. The bearings of the connecting rod on this pin are babbitted and made with removable caps. None of the strain of pressing the bricks comes on the side frames, but is all taken by four heavy steel rods carrying a cross-head to which the lower plungers are bolted. All plungers have their edges faced with hardened steel easily removed and adjusted for wear.

Three heavy coil springs on each side placed at the upper end of the side rods can be adjusted to regulate pressure upon the bricks. During the pressing movement the lower plungers are moving upward while those above move downward, thus pressing the brick from both sides at once.



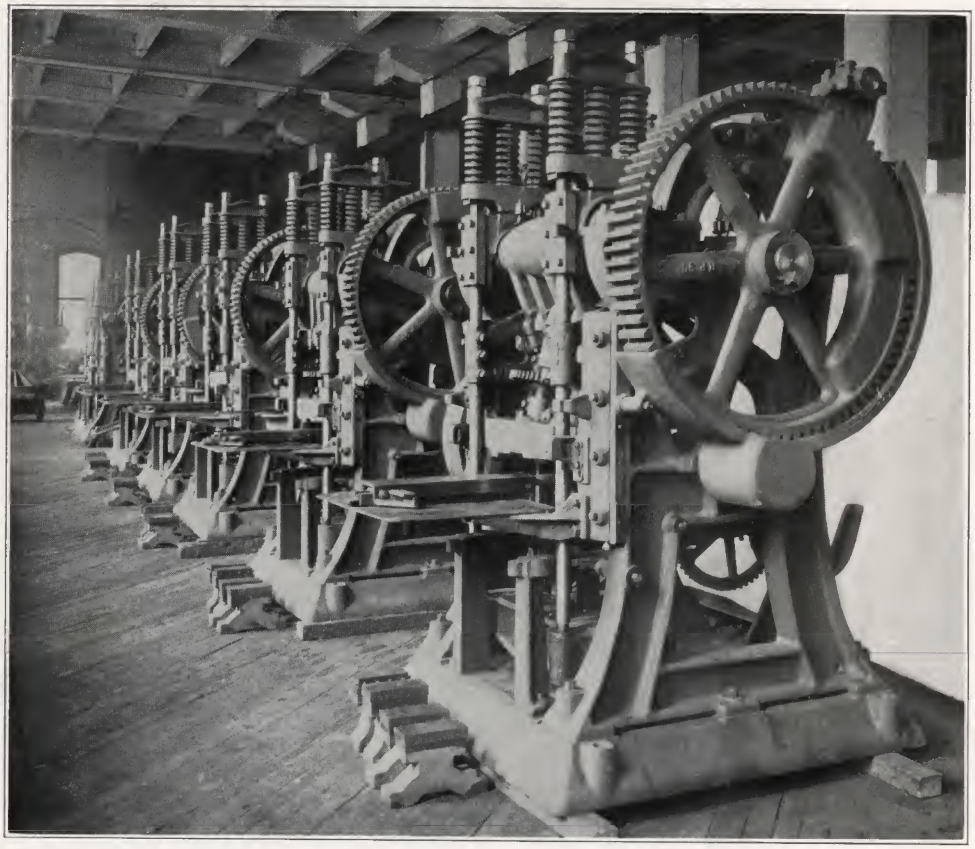
The Philadelphia Repress, No. 2, Rear View, Showing Delivery Mechanism.

The crank is of open hearth steel and is seven inches diameter. From this single crank all the operations of the press are derived. The feeder and charger is actuated by a swinging arm shown in the illustration, page 49, and provided with a simple means of regulating the length of stroke, as well as the position of the feed.

Even at high speed the incoming bricks are correctly placed and the finished ones delivered smoothly upon the carrying-off belt. The upper plungers are secured to a cross-head having very liberal guide surfaces, securing alignment with minimum wear. Adjustment for thickness of brick is secured by right and left threads on the toggle connecting-rods, the two being geared together to secure parallel adjustment, thus making it impossible to throw working parts out of line.

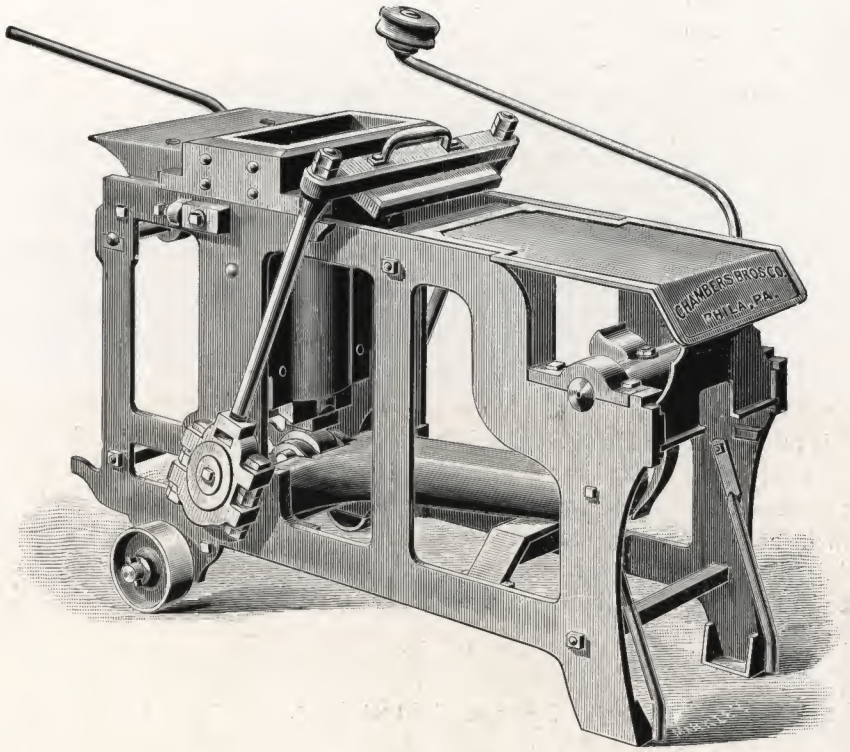
The driving gear is of ample dimensions, the pinion being of steel. The clutch pulley is 30 inches diameter by 6 inches face, a 5-inch belt being ample.

Weight of press unboxed about 12,000 pounds. Bed plate 5 feet long by 4 feet 8 inches wide. Height from floor line to top of side rods 8 feet 7 inches. Delivery belt made of length to suit customers' requirements.



A Shop Line of Philadelphia Represses.

Hand-Brick Press.



For repressing bricks moulded by the Chambers machine, by hand, or by soft mud machines. This is a very powerful press, having steel-lined box with top plate and plunger faced with steel, conveniently arranged for refitting when necessary.

It can be readily moved from place to place about the works, weighs about 900 pounds, and occupies floor-space of 20 inches by 3 feet 6 inches, exclusive of lever.

Ornamental corner-pieces may be used for repressing ornamental shape bricks. Name-plates or trade-marks can be attached to the lower plunger, and special press-boxes to form round edges and corners can be fitted to this press.

Repressed Front Bricks.

In making repressed front bricks from our machine, we use a die that will mould bricks *narrow* enough to drop into the press-box, and thick enough to contain sufficient clay to press out to the required size. This change of die can be made in five minutes.

When red bricks are desired, we use a very fine sand largely impregnated with iron, baked dry and sieved, which, placed in the Automatic Sander of the brick machine, coats the sides and edges of the bricks with a veneering of fine sand, which, when burned, aids in producing rich red color and soft finish. These bricks, taken from the machine in the usual manner, are carefully loaded on barrows designed for the purpose, and the heads of the bricks are rubbed with sand by hand. (See illustration, page 25.)

The Automatic Head Sander.

If an Automatic Head Sander is a part of the equipment, it should be used to sand the heads in preference to rubbing by hand. (See cut, page 26.) The best results are obtained by taking these bricks to a "press shed" and piling them in a "close hack," to prevent the air from passing between them and drying the edges and corners too soon. In a few hours they may be put through the presses in the usual manner, each brick being handled by paddles, to avoid finger-marks.

Repressed Stretchers.

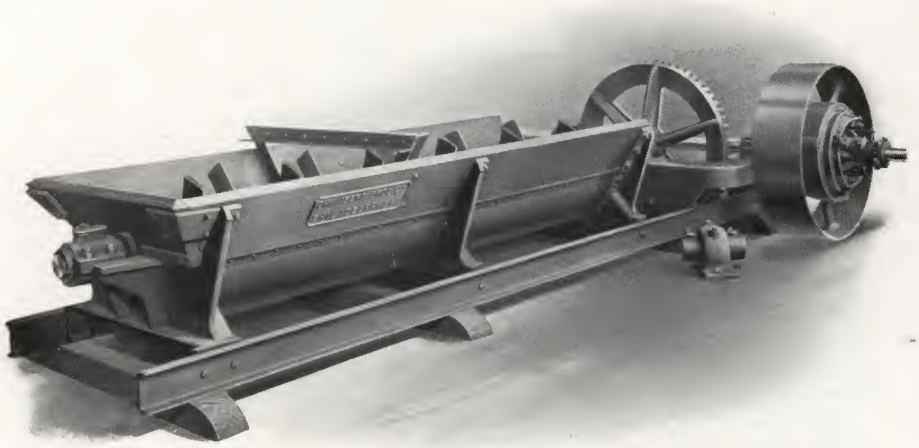
A second quality of repressed front bricks is made by taking the bricks from the Chambers machine immediately to the presses, which may be located close to the delivery belt of the brick machine. These are usually made to finish to the same thickness as the common brick, and are not handled with quite the same care as the regular front brick.

Head-Sanded Stretchers.

These are selected common bricks right from the delivery belt of the brick machine and transferred to the Automatic Head Sander (shown on page 26). By brushing sand into the heads of these end-cut bricks, the slightly ruffled appearance caused by the cutting wire is removed, and, when burned, the heads show the same color as the face side.

They make a profitable grade of brick, and are favorably received in markets that have been accustomed to using only sand struck, soft moulded bricks.

Mixing and Pugging Machines.



Bevel Geared Clay Granulator, No. 30.

Our brick machines are not simply forming and expressing machines, but have in every case a liberal tempering chamber, with shaft and knives, which often proves sufficient to pug the clay enough for making good brick. We believe, however, that the importance of proper preparation of the clay can scarcely be over-estimated.

Horizontal Clay Granulators and Feeders.

These machines receive clay in car-load lots, will shave the lumps into smaller pieces and immediately commence the mixing of clay and sand or different strata. One of the most valuable features of a granulator is that it saves labor in feeding and insures a uniform supply of material to the subsequent machinery, the hopper over the granulator serving as a reservoir. The knives in the granulator shaft are adjustable and can be set to feed a given amount of clay per minute so long as there is in the tub of the machine sufficient clay to cover the shaft.

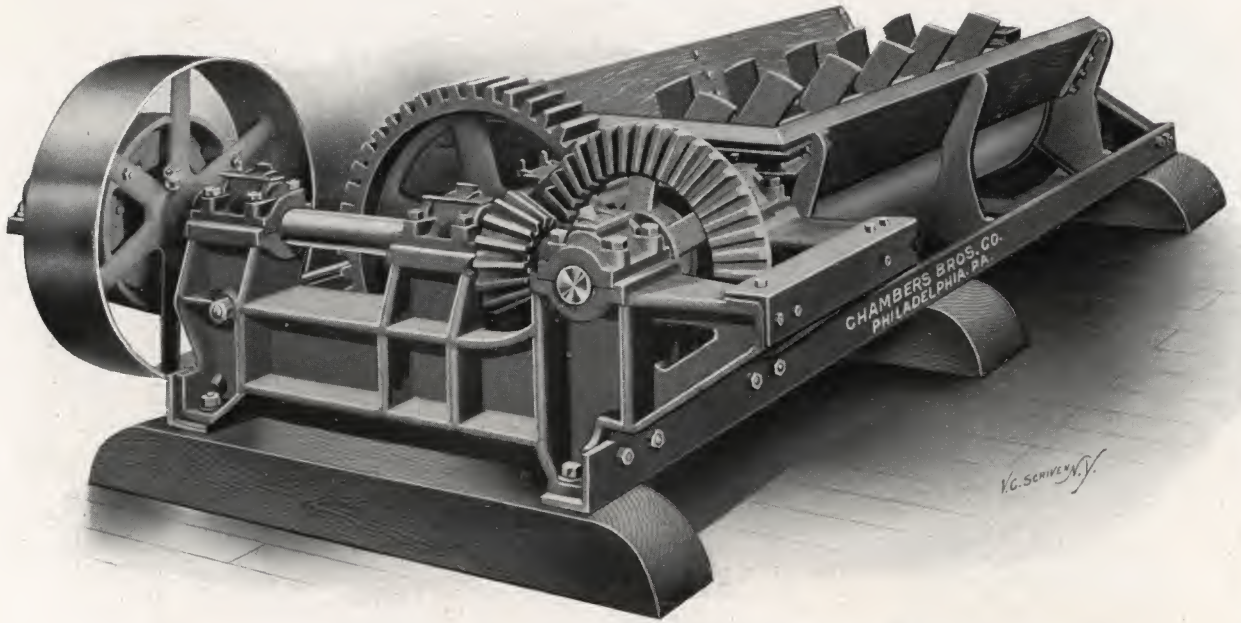
We build several patterns of granulators of various capacities and arranged to suit the installation with other machinery. Among those suitable for use with our numbers 5, 6, or 10 size brick machines, are the following, all having steel knife shafts and being mounted on steel channels with iron cross rails.

GRANULATOR No. 30. Bevel Geared Pulling Pattern. Tub 10 feet long. Machine over all 16 feet 3 inches. Clutch pulley 44 inches in diameter by 12-inch face. Drawing number 89-C-88.

GRANULATOR No. 31. Bevel Geared Pushing Pattern. General dimensions same as No. 30. Drawing number 89-C-86.

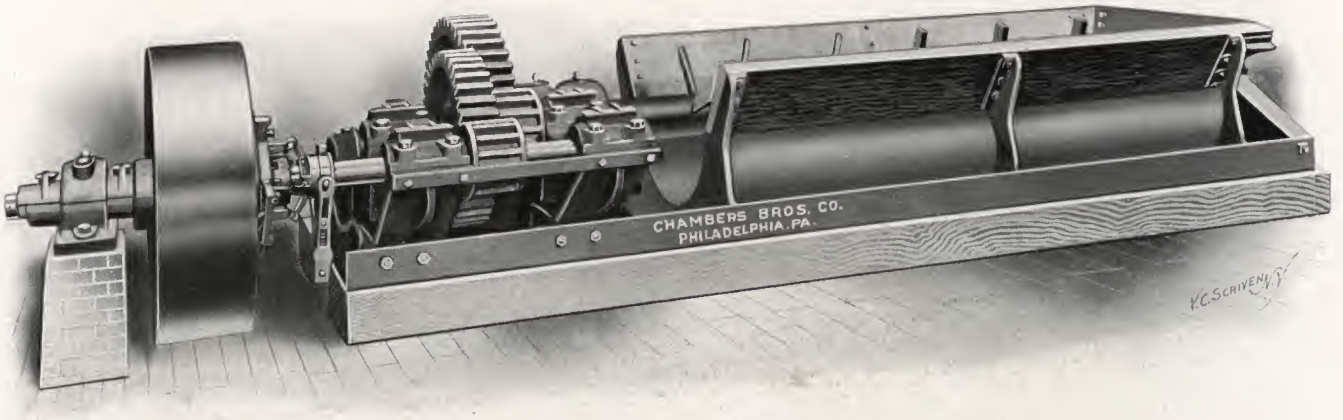
GRANULATOR No. 32. Spur Geared Pulling Pattern. Tub 10 feet long. Length of frame over all 16 feet 3 inches. Friction clutch pulley 40 inches in diameter by 12-inch face. Drawing number 89-C-84.

GRANULATOR No. 33. Spur Geared Pushing Pattern. Same general dimensions as No. 32. Drawing number 89-C-87.



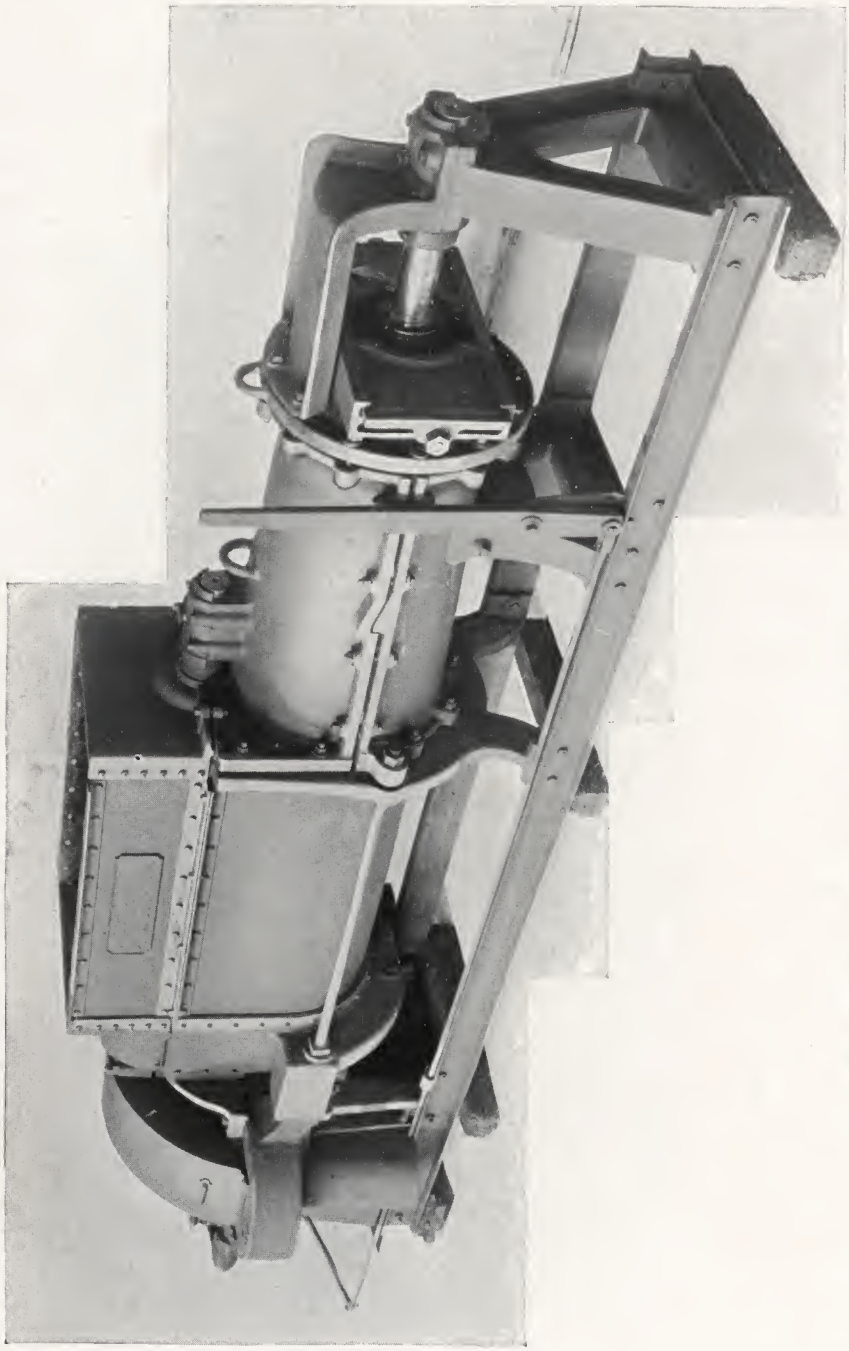
Bevel Geared Clay Granulator and Feeder, No. 14.

This machine is designed to work on a horizontal plane, and has the gearing placed at the discharge end entirely away from the falling dirt at the entrance end. It is made with the sides of the tub flared as shown above, or with vertical sides as in illustration of spur-geared machine, page 63. The main shaft is of hammered steel 8 inches in diameter carrying forty forged steel knives. The driving- and counter-pinions are of steel, and all gears are journalled in an iron frame bolted to heavy steel angles. Clay may be dumped by the carload into this machine and in lumps as dug by steam-shovel. The friction-clutch pulley is 40 inches in diameter by 12-inch face. Length of frame, 19 feet. Width, 5 feet 6 inches. Height from bottom of frame angle to top of flared hopper, 3½ feet. Weight of machine, unboxed, is about 14,500 pounds.



Spur Geared Clay Granulator and Feeder, No. 14 S.

The general dimensions and construction of this mill is the same as No. 14 Granulator, page 54. The illustration shows discharge of clay towards gear end, but machine may also be built to discharge clay from opposite end of tub.



The Chambers No. 1 Combined Mixing and Pugging Machine.

(See also pages 57 and 58.)

The Chambers Combined Mixing and Pugging Machines.

Designed for mixing two or more ingredients, or dry and wet materials, and delivering a thoroughly mixed, well pugged mass in uniform quantity. Especially valuable for mixing "grog" or ground calcined material with plastic clay, ground shale with tough clays, and other finely ground or granular material with plastic binders.

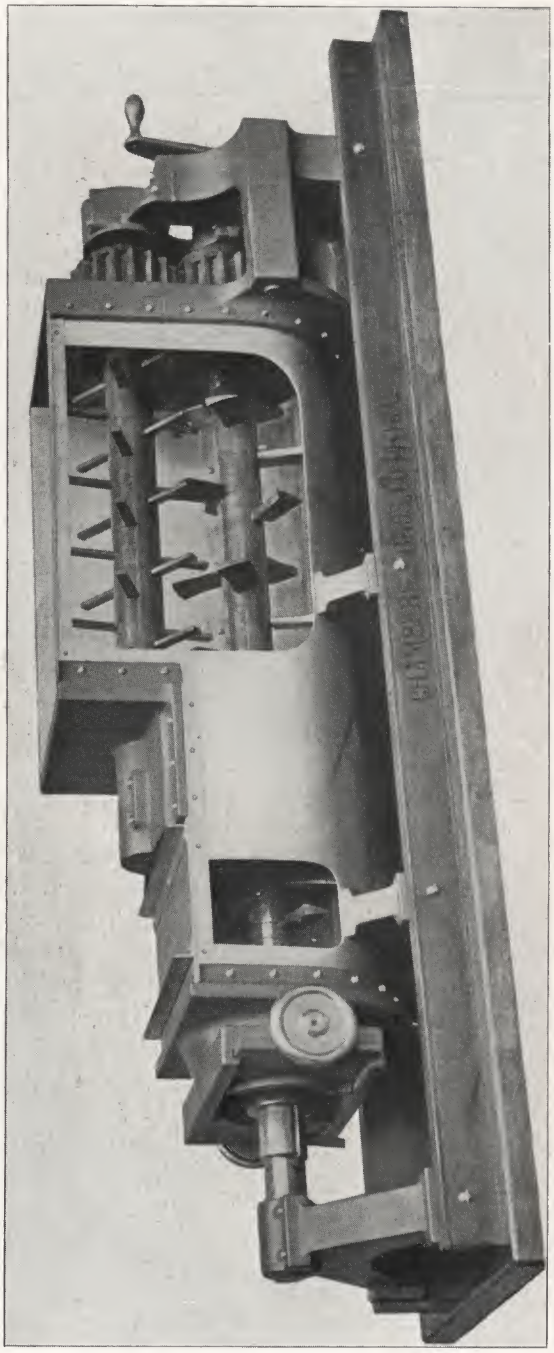
In this machine we have combined the features of the Double-Shaft Mill for mixing different materials with the long enclosed case containing single shaft only for pugging stiff plastic clays. The main pug shaft is of hammered steel, 7 inches diameter, and is fitted with our regular steel-faced tempering knives, adjustable to any desired position. Immediately over this shaft and extending for about one-half the length of the pug chamber is an independent mixing shaft carrying four rows of steel bars so located that they just clear the tempering knives in the main shaft. The distance between the two shafts only slightly exceeds the lengths of the knives. The operation of these two shafts in the material with the close passage of the knives to each other secures a thorough *mixture* of different ingredients before reaching that part of the chamber in which the process of pugging is completed. The rear portion of the pug chamber is open at the top, thus giving ample opportunity for examination of material and regulating water supply.

The mixed and moistened mass of material is slowly and continuously fed forward to the enclosed portion of the pug chamber, where it is thoroughly pugged under pressure and discharged by means of a short, double-bitted hard auger through a circular opening, the size of which can be changed at will.

The entire machine is about 19 feet long. It is strong and heavily built, being mounted on channel iron framing with the driving-car journalled in one solid casting and with all journals well protected from dirt and easily oiled. The driving- and counter-pinions are of steel, as are also the gears that drive the mixing-shaft. The driving-shaft is fitted with an outer bearing and with a bronze bushed friction-clutch pulley 48 inches diameter by 12 inches face.

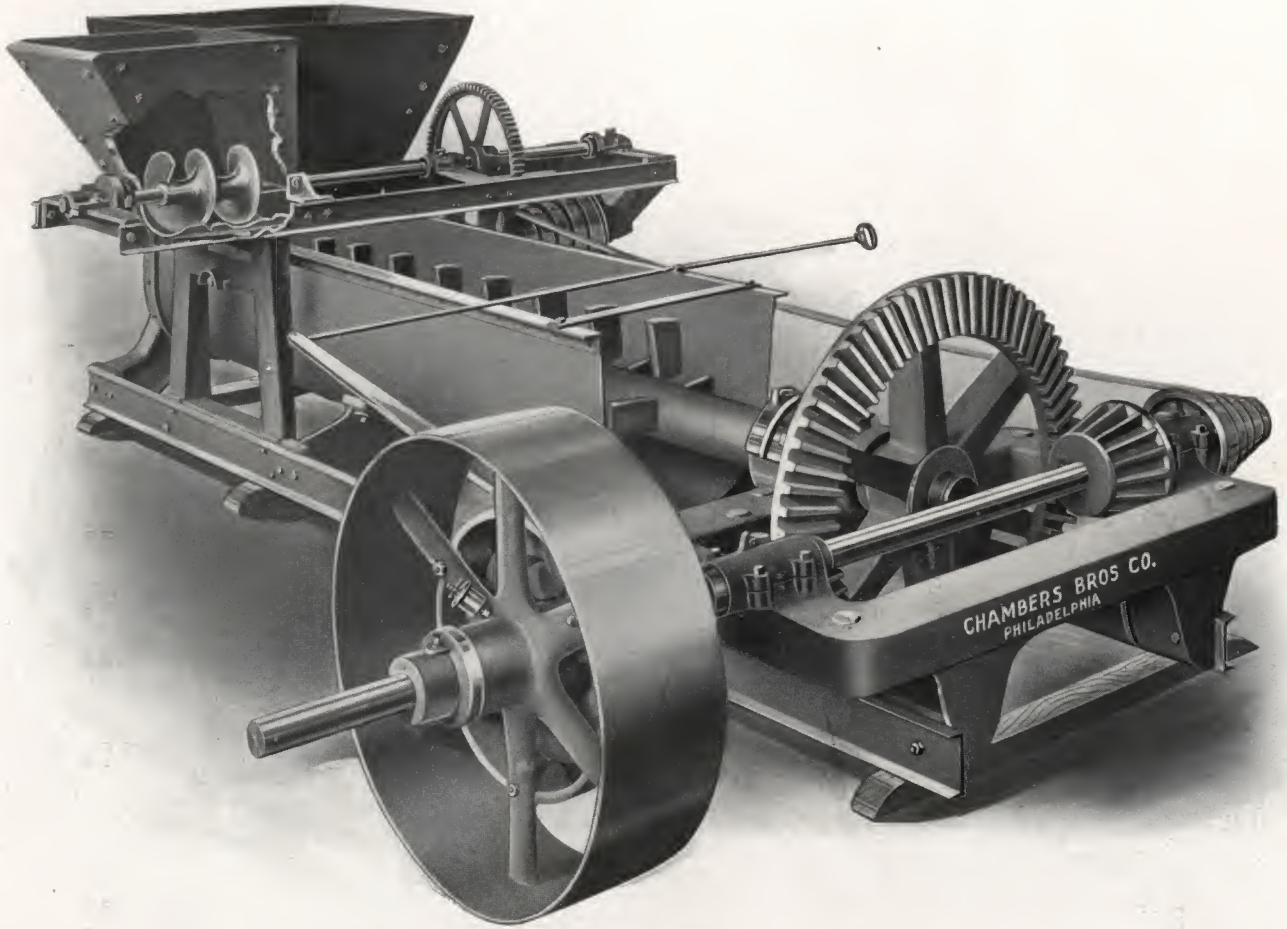
We are prepared to furnish two sizes of this style of mill.

(See illustration, page 56; also page 58.)



Photographic reproduction from working model of The Chambers Combined Mixing and Pugging Machine, showing arrangement of the two shafts and sets of knives.

(See also pages 56 and 57.)



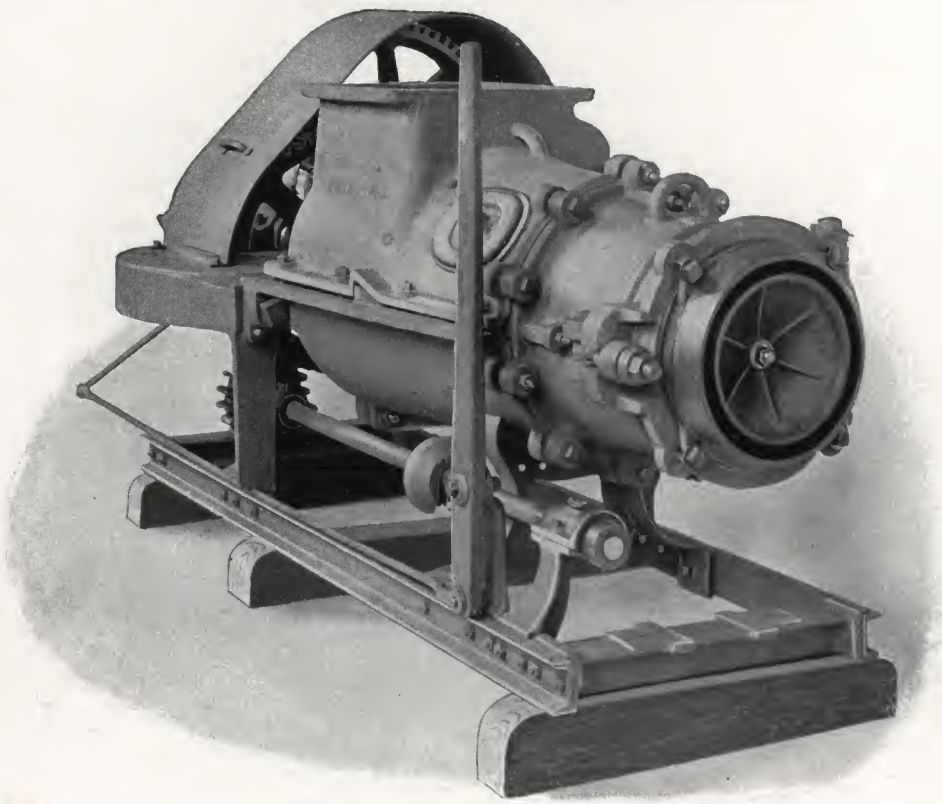
The A. R. Root Combined Sand and Clay Mixing Machine.

Producing and maintaining uniform mixture. Proportions varied by simple adjustment of machine.

The A. R. Root Combined Sand and Clay Mixer.

In this machine there are two feed hoppers, the larger one for clay opening directly into the main cylinder or tub of the pug mill. The sand hopper adjoining has a semicircular steel bottom in which is placed an iron conveyer arranged to discharge from its end at a point well within the side of pug mill tub. The hopper may be filled with sand and so long as there is sufficient quantity to cover the conveyer there will be an exact amount fed into the pug mill where it falls directly upon the clay. The mixture of sand with clay thus commences immediately at the entrance end of the pug mill tub. The sand conveyer is driven through the medium of a spur gear and pinion. Upon the pinion shaft is secured a five step cone pulley, so that by shifting its belt from one step to another a wide range in the proportion of sand to clay is easily obtained. In addition to this the knives in the pug shaft of the mill are adjustable as to pitch. The whole machine is very substantially built, the main gear frame being one solid casting and mounted upon a framework of steel channels. Driving shaft is $2^{15}/_{16}$ inches diameter, with friction clutch pulley 40 inches diameter by 12½ inches face. Unboxed weight, about 9,200 pounds.

The machine may be used not only for sand but to feed exact proportions of coal dust, ground calcined clay, coke, or any finely divided dry material which it is desired to mix with some plastic mass.



Chambers No. 4 Size Machine with Tile Die.

The Hudson River Clay Mixer.

(Patent applied for.)

We have designed a special machine for mixing clay, sand, and coal screenings in exact proportions, which can be modified by slight adjustment of the machine, and the proportions thus changed to suit different localities. This is an elaboration of the mixer described on pages 59 and 60. There are separate hoppers for each of the three materials, which may be charged by the cart-load, the one provided for the clay being of the largest capacity and capable of receiving about two cubic yards at a time.

This part of the machine is built with a boiler iron tub, heavy pug shaft, and adjustably secured forged steel knives. On one side is arranged the hopper for the sand, from which the material is fed by a worm whose pitch and speed insures a fixed quantity being fed into the main cylinder with the clay. Upon the other side is a similar hopper with feed mechanism for the coal screenings. The speed of these feed worms, relative to the speed of the clay shaft, can be easily changed, and convenient provision is made for quickly changing the pitch of the feed worm itself. The brickmaker can thus adjust this machine to prepare clay for "single" or "double coalies."

The length of the main clay tub and its shaft is varied to suit the amount of preparation desired in different localities. The main purpose of the machine is to feed into the brick machine or on to some suitable conveying mechanism a continuous supply of mixed material in exact proportions, which are capable of modification as may be needed by different operators. The practice of "pit filling" in common use to secure this result is avoided, together with a large portion of the labor and expense incident to filling the pits and shovelling the mixture from the pits to the brick machines. The necessity for filling the pits several hours before the day's operation of brick moulding commences is saved and a much more reliable preparation of the different ingredients, as well as a better mixture thereof, secured by the use of our machine.

LUMBER CITY BRICK CO.

LUMBER CITY, GA.

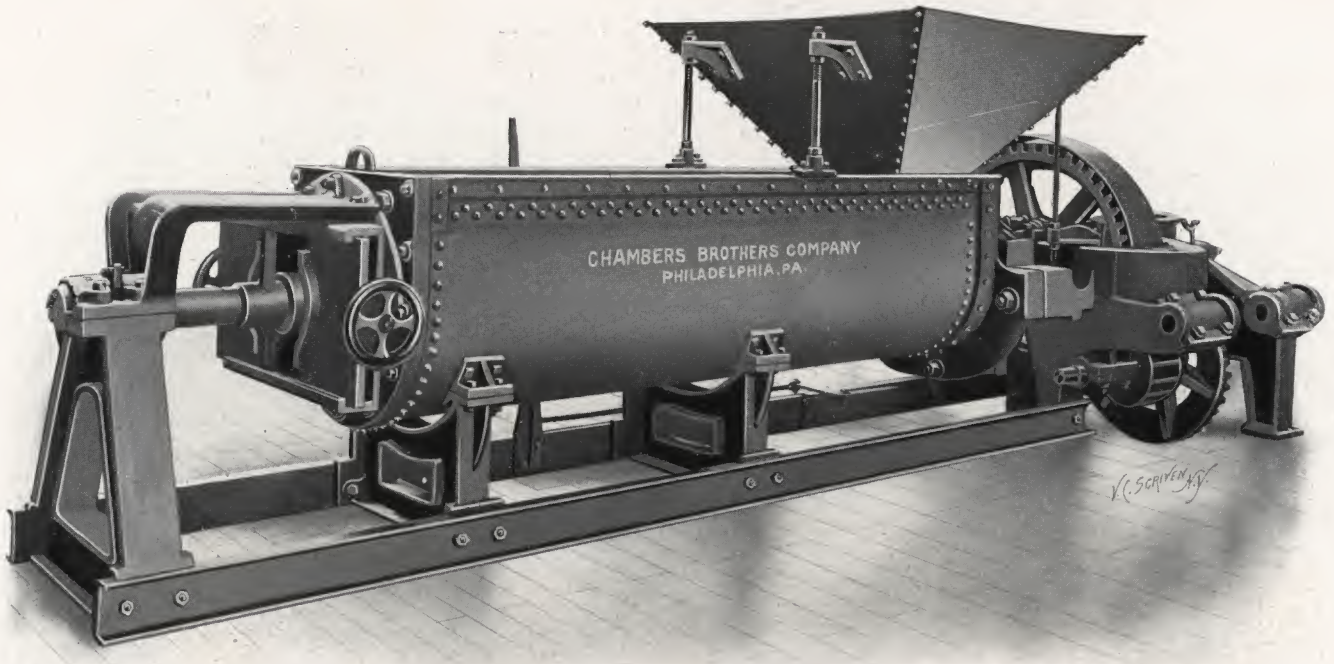
MESSRS. CHAMBERS BROS. CO., Philadelphia, Pa.

Dear Sirs:—. . . Just want to say that the Chambers Brick Machine makes good brick and lots of them. We only make with our 35-thousand capacity machine 40 thousand and upward to 50 thousand brick per day. Our clay is tough.

Yours very truly,

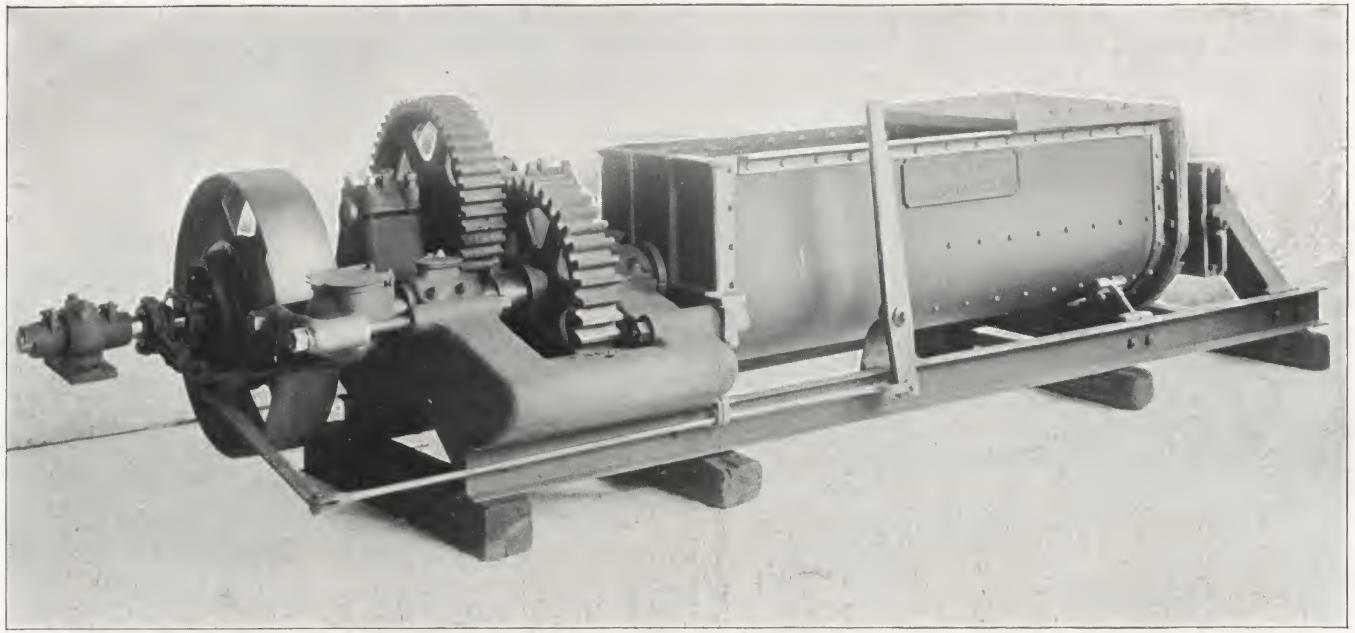
LUMBER CITY BRICK CO.,

Per W. H. PITT, *Supt.*



Water-Jacketed Heavy Mixer No. 1-B.

This is a very strong machine, with water-jacketed tub designed to carry boiler pressure. The whole machine is mounted in framework of steel channels with iron cross rails. Driving gear is journalled in the frame used for our No. 7 Brick Machine. This mixer may be built either spur- or bevel-geared. It has friction-clutch pulley 48 inches diameter, forged steel pug shaft carrying 37 knives adjustably secured. Length over all about 19 feet 6 inches. Tub alone about 10 feet long by 30 inches wide. Height, including flared hopper, 5 feet 10 inches. Unboxed weight about 16,500 pounds. The top of tub may be covered with steel plates and the discharge end fitted with taper case having adjustable gated mouthpieces.

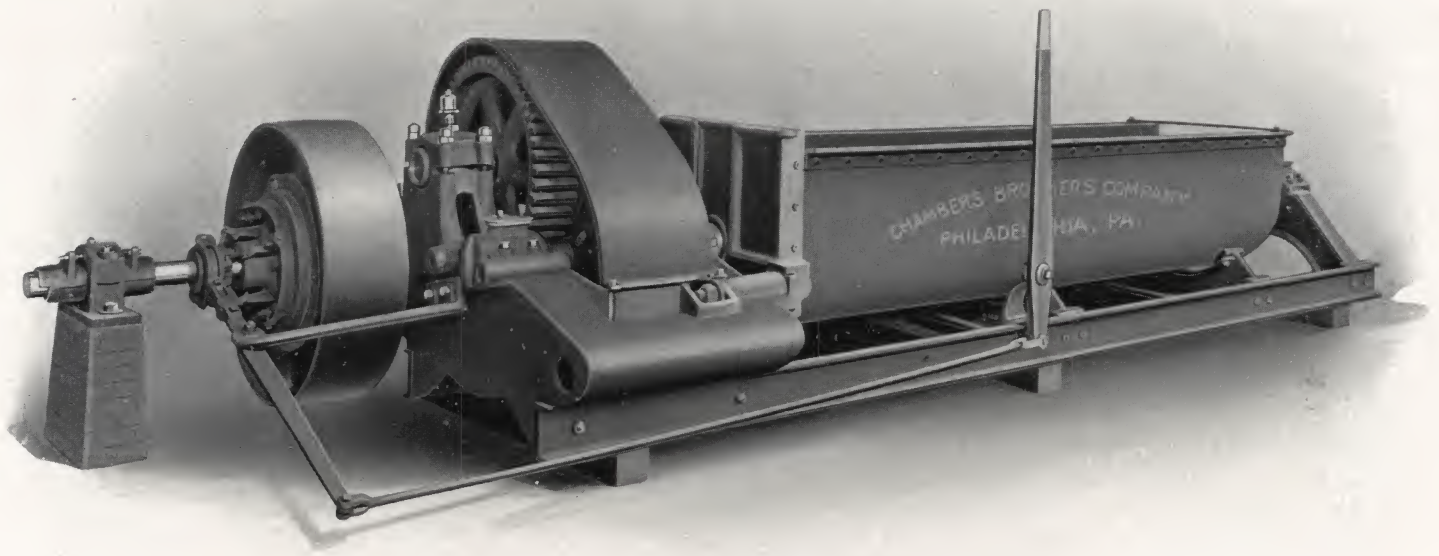


The Chambers No. 2 All-Iron Single-Shaft Pug-Mill.

This is a strong, single-shaft horizontal pug-mill, pugging clay under pressure and discharging by means of a short double-bitted hard iron auger through a circular opening, which can be made smaller or larger at will. It has a pug-shaft 6 inches in diameter, with forged steel-faced knives so secured to the shaft that they can be set at any desired angle.

The whole machine is about 14 feet long, and is mounted on channel frame with the journal bearings of driving-gear all in one solid casting. The driving- and counter-pinions are of steel.

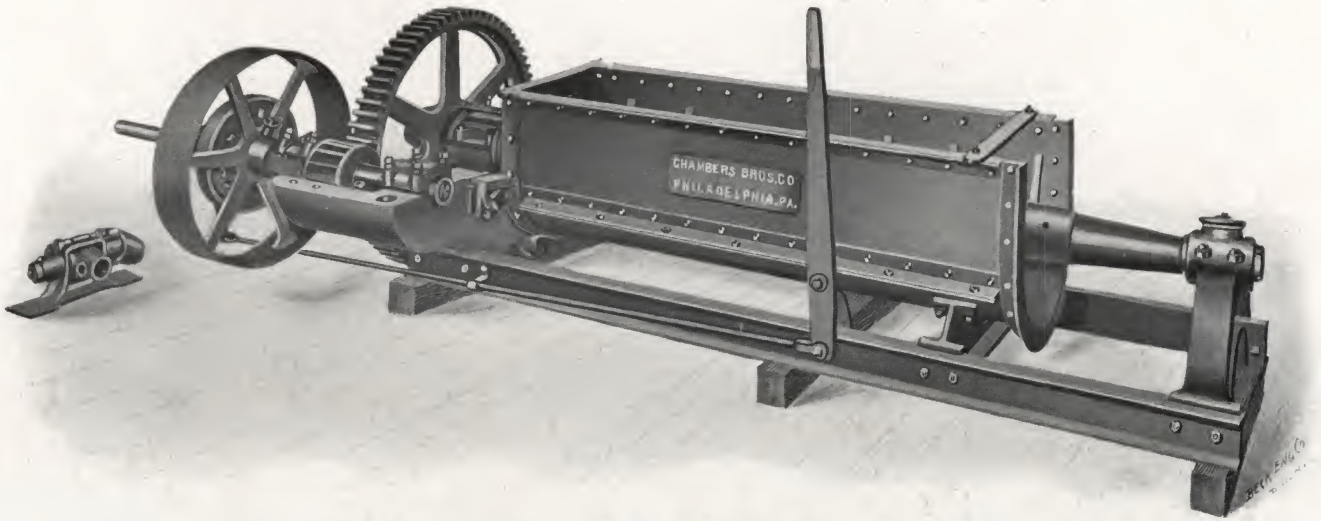
The machine has bronze bushed friction-clutch driving-pulley 36 inches in diameter by 8 inches face, and is designed and guaranteed for heavy work. Unboxed, weight about 8500 pounds.



No. 2-B—Single-Shaft Pug-Mill.

This mill is geared the same as No. 2, page 63, but has an open end tub. When made with tub 10 feet long, cast-iron pug shaft 7 inches diameter and carrying 40 forged steel knives is used. Unboxed, weight about 8500 pounds.

This same mill may be built with tub 12 feet long, using a forged steel shaft carrying 48 knives. In this event heavier clutch pulley is used, providing increased belt surface. Unboxed, weight about 9200 pounds.



The Chambers No. 3 All-Iron Single-Shaft Pug-Mill.

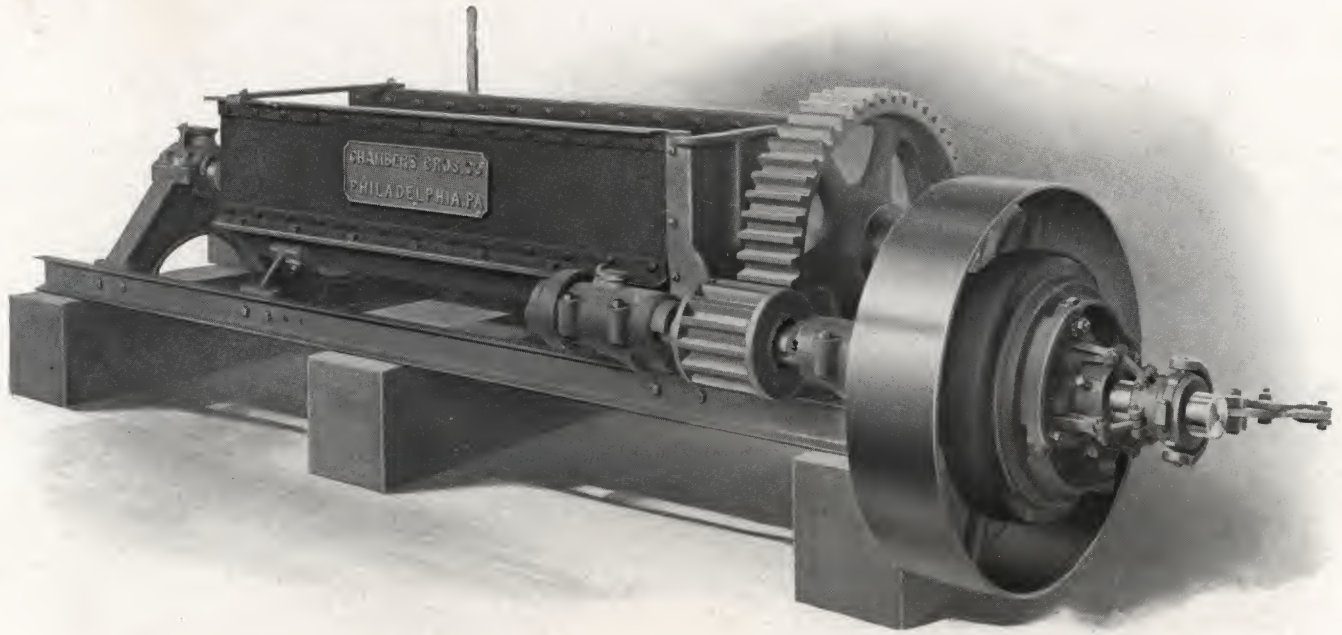
This is an open-top horizontal pug-mill having 6-inch diameter pug-shaft and pugging knives so secured to the shaft that they can be set at any desired angle.

It has single gear of large diameter with shrouded driving pinion and is fitted with friction-clutch driving-pulley 36 inches diameter by 8½ inches face. Speed of pulley, 162 revolutions per minute for 30 turns of pug-shaft per minute.

The journal bearings are in one solid casting, and the whole machine is mounted on steel channel frame with iron cross rails.

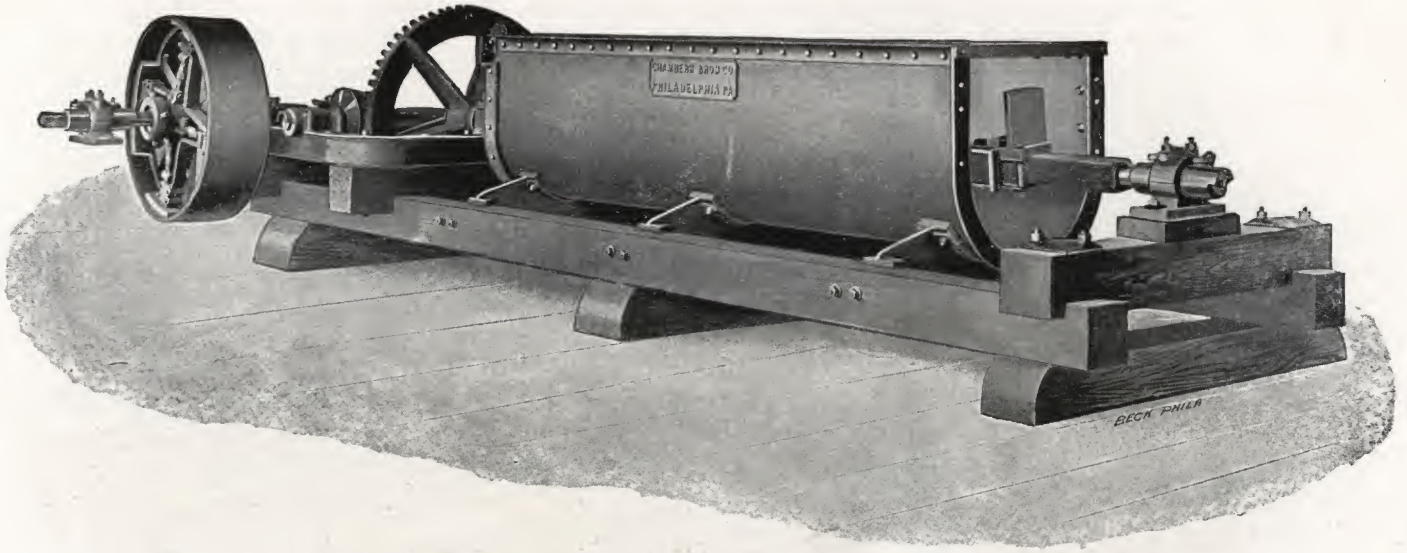
No. 3 Reversed Mill.

This mill is also made with tubs reversed, so as to discharge the clay towards the gear-end of the machine. Tub, 7 feet 4 inches long. Net weight, 4800 pounds.



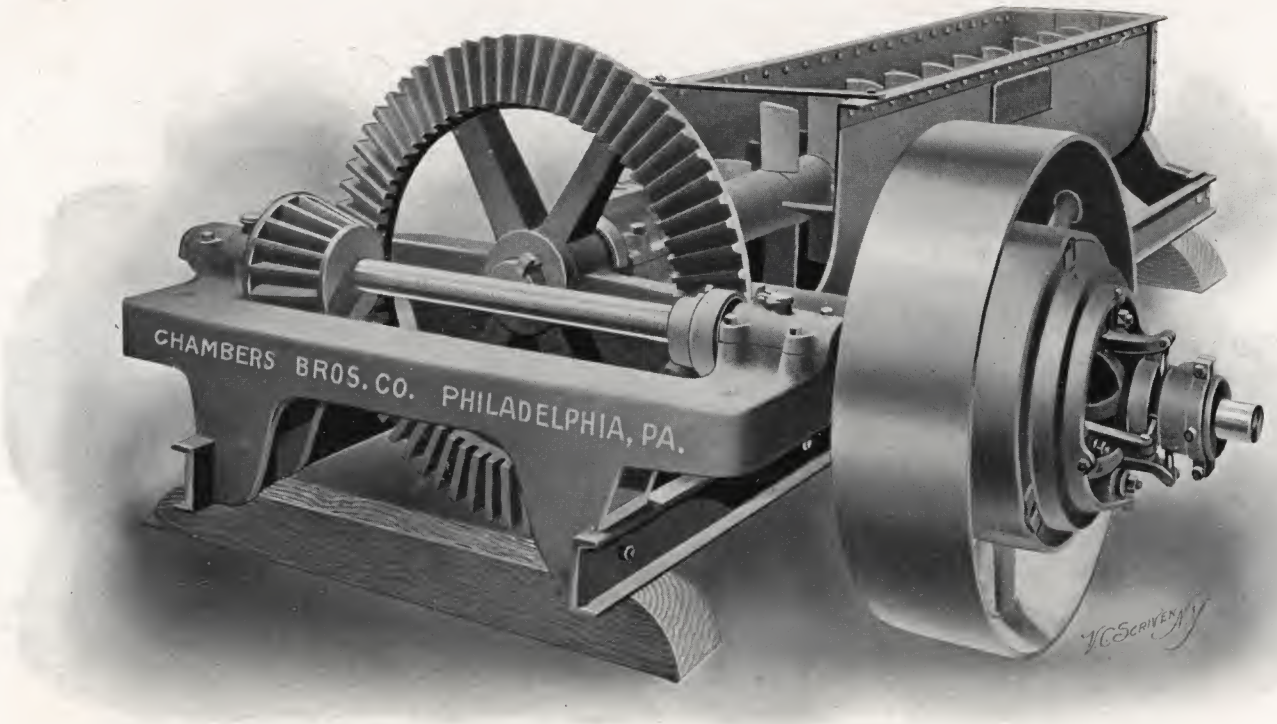
The Chambers No. 4 All-Iron Single-Shaft Pug-Mill.

This is an open-top horizontal mill, having 5-inch diameter pug-shaft and 30 steel pugging knives, so secured to shaft that they can be set at any desired angle. It has single gear and pinion of strong, heavy design. The driving-shaft is $2^{15}/_{16}$ inches diameter, and is fitted with friction-clutch pulley 30 inches diameter by $7\frac{1}{2}$ inches face, supplied with starting lever. The whole machine is mounted on framework of steel channels, and all bearings are entirely out of the dirt and well protected. Usual speed of driving pulley, 180 revolutions per minute. Weight, unboxed, about 3100 pounds.



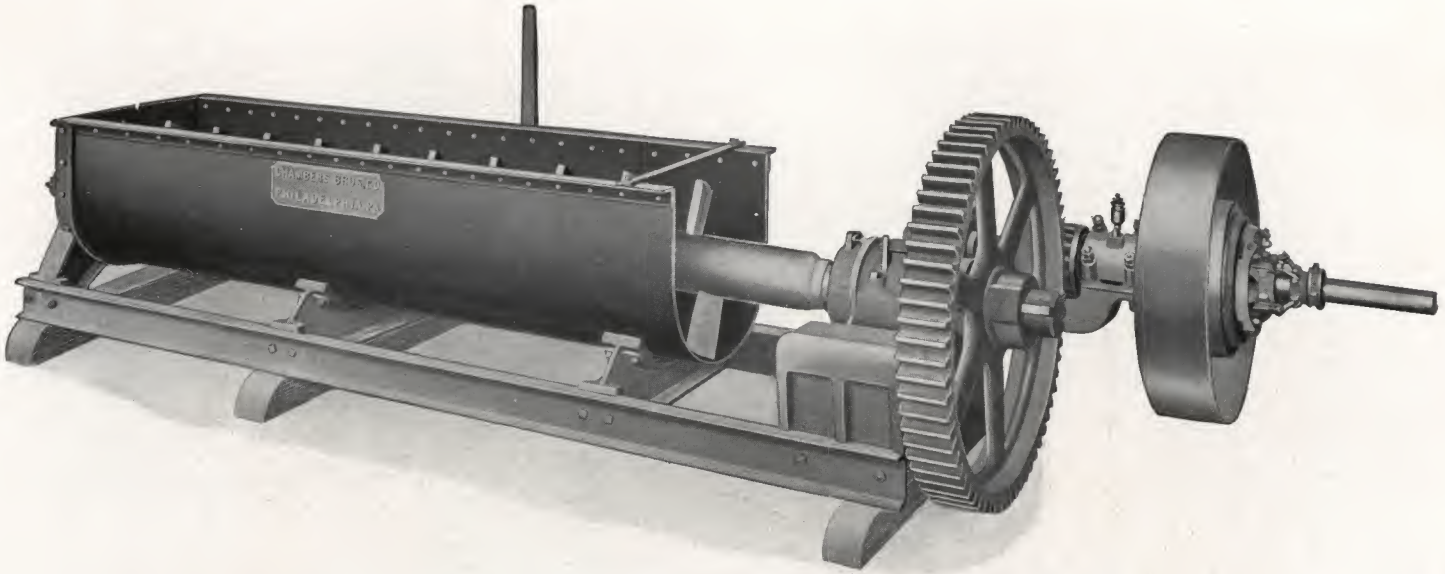
The Chambers No. 7 Extra Heavy Bevel-Geared Mill.

Has friction-clutch pulley on driving-shaft $2^{15}/_{16}$ inches diameter. Boiler-iron tub, 10 feet long. Main frame, 18 feet long by 5 feet wide. Pug-shaft of 4 inches square steel. All gearing journalled in solid frame casting. Weight about 7500 pounds. This machine may be used in horizontal position or with front end elevated. Designed for concrete and cement mixtures—contractors' work. For making stiff clay puddle for reservoir-beds. Can be built with compound gear if required. Weight about 8800 pounds.



No. 7 B—Bevel-Geared Pug-Mill.

Has large diameter bevel gear of semi-steel, with double shrouded pinion. Driving shaft $2^{15}/_{16}$ inches diameter. Friction clutch pulley 40 inches diameter by 12-inch face. Pug shaft 7 inches diameter with adjustable forged steel knives. Iron gear frame mounted on 6-inch steel channels. Tub made 7 feet 3 inches, 10 feet, or 12 feet long with corresponding number of knives as ordered. Unboxed, weights about 7200, 7600, and 8000 pounds respectively.



No. 8 Spur Gear Pug-Mill.

This mill is made with tub 10 feet long. It is strong and substantial, but presents great simplicity of construction. Placing the gears where shown removes them from the point at which clay is fed into the mill. All journal bearings are entirely outside the clay tub. The 10-foot length carries forty forged steel knives so secured that they can be set at any desired angle with the shaft. This feature regulates the feed, secures a uniform output, and with those who know is a plan much appreciated. An adjustable ball-and-socket bearing for supporting end of driving-shaft is furnished. Weight, unboxed, about 7500 pounds. Length from outer edge of driving-pulley to rear end of tub, 15 feet 2 inches. Width of steel channel frame, 3 feet. Height from bottom of steel channels to top of tub, 2 feet 8 inches. Outside diameter of main gear, 3 feet 10 inches.

Memorandum of Pug-Mills Not Illustrated.

We have drawings and patterns for various mills not illustrated, but which have been built to meet different conditions.

Catalogue No. 24. Drawing 90-C-40. Pushing Mill, tub 24 inches diameter, 14 feet 9 inches long. Steel shaft with 59 knives.

Catalogue No. 25. Drawing 90-C-43. Pulling Mill, or reverse of No. 24. Same dimensions.

Catalogue No. 26. Pushing Mill, drawing 90-C-78, 28 inches diameter, tub 14 feet 9 inches long.

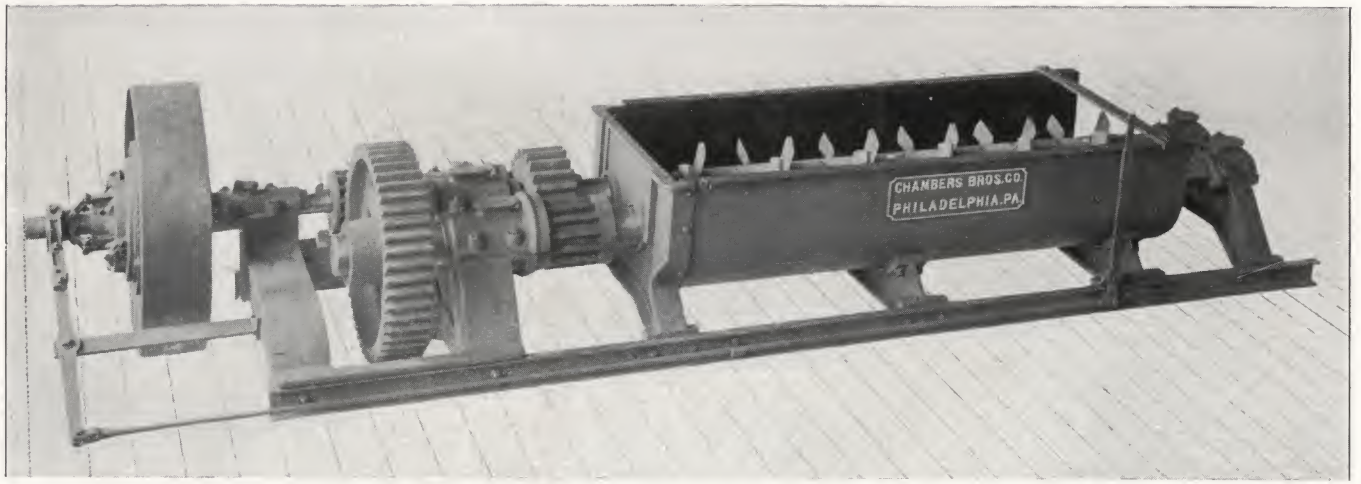
Catalogue No. 27. Pulling Mill, same dimensions as No. 26.

Catalogue No. 28. A double or countergeared mill with 28-inch diameter tub, 14 feet 9 inches long, and practically the same as the pushing mill on drawing 90-C-78, excepting that it will be double geared instead of single geared.

Catalogue No. 28. Drawing 88-B-129. Same dimensions as No. 28, but pulling pattern.

SMALL PORTABLE CONCRETE MIXER, No. 9.

The illustration shows a sprocket wheel for chain belting as the means of driving, but if customer prefers we furnish plain belt pulley. The machine is mounted upon broad-tread wheels to facilitate change of position. The tub is of boiler iron, 7 feet 9 inches long by 25 inches diameter. Steel mixing-shaft is 3 inches square and the journal bearings are in halves, babbitted and located entirely outside the tub and away from contact with the dirt and grit. The mixing-paddles are forged. The wheels are 14 inches diameter by 6 inches tread and the distance from centre to centre of axles is 8 feet 2 inches.



The Chambers No. 6 Double-Shaft Horizontal Mixing and Pugging Machine.

This mill is shown with open top, but is so designed that the top may be covered, say one-half or two-thirds of the distance back from the discharge end. It is a double-geared machine, with all bearings outside the tub and away from the material to be worked.

It has two 5-inch diameter shafts, carrying 48 steel knives—24 in each shaft—so secured that they can be set at any desired angle. The driving-shaft is $2^{15}/_{16}$ inches diameter and is fitted with friction-clutch pulley, 36 inches diameter by 8½ inches face, with starting lever located at a convenient position for the attendant. The whole machine is on a frame-work of steel channels, and all the driving-gear is journalled in one solid casting. Width of frame, 3 feet. Length, exclusive of driving-pulley, 13 feet 6 inches. From bottom of frame to top of tub, 2 feet. Weight, unboxed, about 5500 pounds.

A speed of 140 revolutions per minute of driving-pulley gives 40 revolutions per minute of pug-shaft.

For mills of larger size, same style, see Nos. 11 and 12, page 75; Nos. 16 and 17, pages 73 and 74.

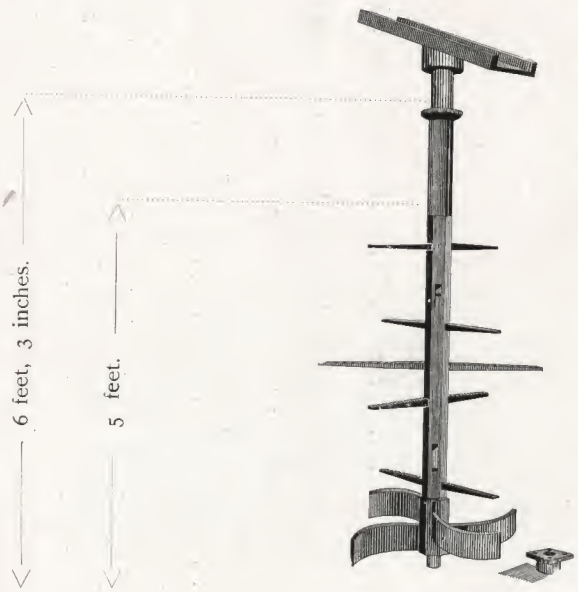
VERTICAL PUG-MILL, No. 10.

We also build a bevel-geared vertical pug-mill fitted with friction-clutch, or tight and loose driving-pulleys. The framework of this mill is of hard wood, mortised and bolted, with all bearings in babbitted clamp boxes. The pug-shaft is of cast-iron, about 4 inches in diameter, and contains forged wrought pugging knives. Wrought-iron sweeps discharge the clay through an opening in one side of the box near the bottom.

Floor-space occupied, 4 feet 6 inches by 6 feet 6 inches. Height from floor to top of mud box, 6 feet; to top of gearing, 10 feet 6 inches.

A SOFT-MUD MILL FOR HAND-MOULDED PROCESS.

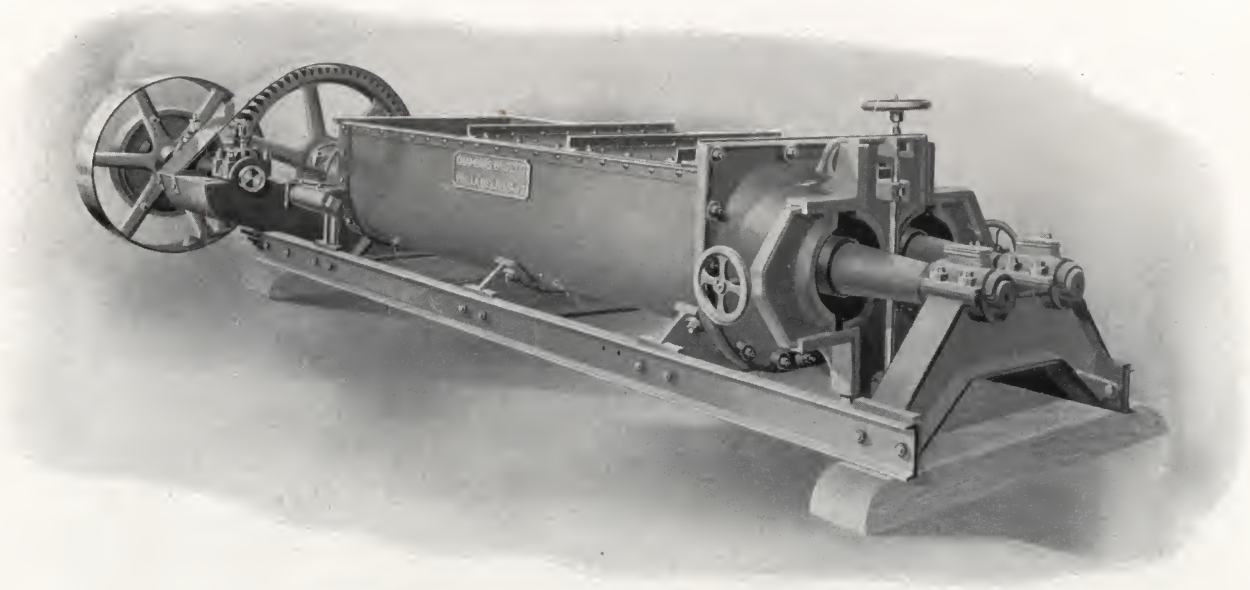
Pug-Mill Shaft for Horse-Power.



FOR MIXING AND GRINDING CLAY FOR HAND MOULDING.

This appliance consists of pug-shaft 4 inches in diameter, with sweep-block, collar, knives, mud wipers, and bottom step-plate. Total weight about 500 pounds. There are four wipers 6 inches wide and of 3 feet diameter. Height from bottom of wipers to bottom of sweep-block is 6 feet 3 inches.

The complete frame and box will be furnished in connection with this shaft when desired.

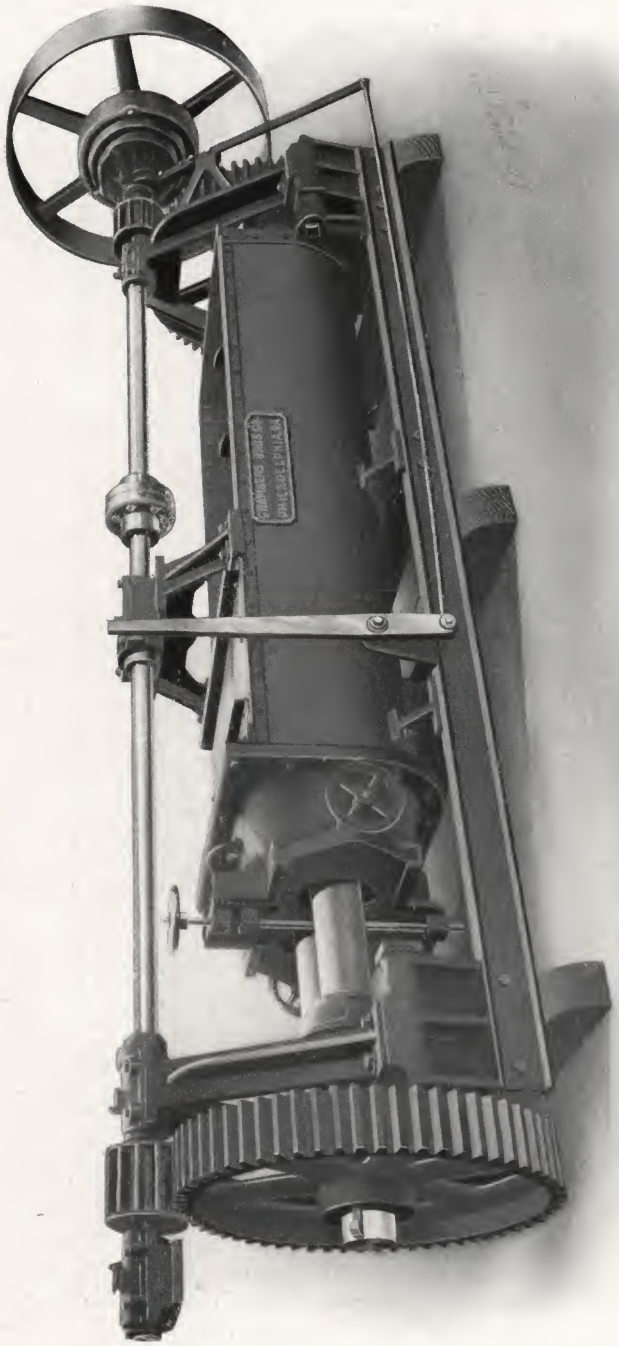


Double Shaft Mixing and Pugging Mill, No. 16.

The thorough mixture of two or more kinds of tough clay, shale with clays, or ground calcined material, requires more than the ordinary open-top pug-mill having a free discharge. Our No. 16 mill has adjustable gated mouth-pieces at end of tubs, with boiler iron plates partially covering the top of tubs. By thus holding the material a thorough mix is secured, lumps reduced, and a smooth plastic mass discharged as wanted. The two 7½-inch diameter shafts carry a total of 57 knives, so secured as to be easily adjustable to any desired angle.

Machine has steel pinions, is mounted on a framework of 6-inch steel channels, and has friction clutch-pulley. Unboxed weight, 12,500 pounds.

Total length of pugging cylinder, 10 feet. From outer edge of pulley to end of channel frame, 18 feet 7 inches. Width of channel frame, 4 feet 5 inches. Height from bottom of channels to top of tub, 32 inches. Friction clutch pulley, 40 inches diameter by 12 inches face.



Double Shaft Mixing and Pugging Mill, No. 17.

Similar to No. 16, but with overhead countershaft and independent spur gear drive for each pug shaft applied at opposite ends of machine. Drawing 87-A-14. Weight about 16,500 pounds.

DOUBLE-SHAFT HORIZONTAL MIXING AND PUGGING MACHINE, No. 11.

A double-geared machine having two pug-shafts each 4 inches square, carrying 26 knives in each shaft. Driving shaft $2^{15}/_{16}$ inches diameter. Friction-clutch pulley 36 inches diameter by 8 inches face. Whole machine mounted in framework of 4-inch steel channels. Width of frame, 3 feet. Length, exclusive of pulley, 16 feet 6 inches.

From bottom of frame to top of tub, 24 inches. Weight, unboxed, about 7000 pounds.

DOUBLE-SHAFT HORIZONTAL MIXING AND PUGGING MACHINE, No. 12.

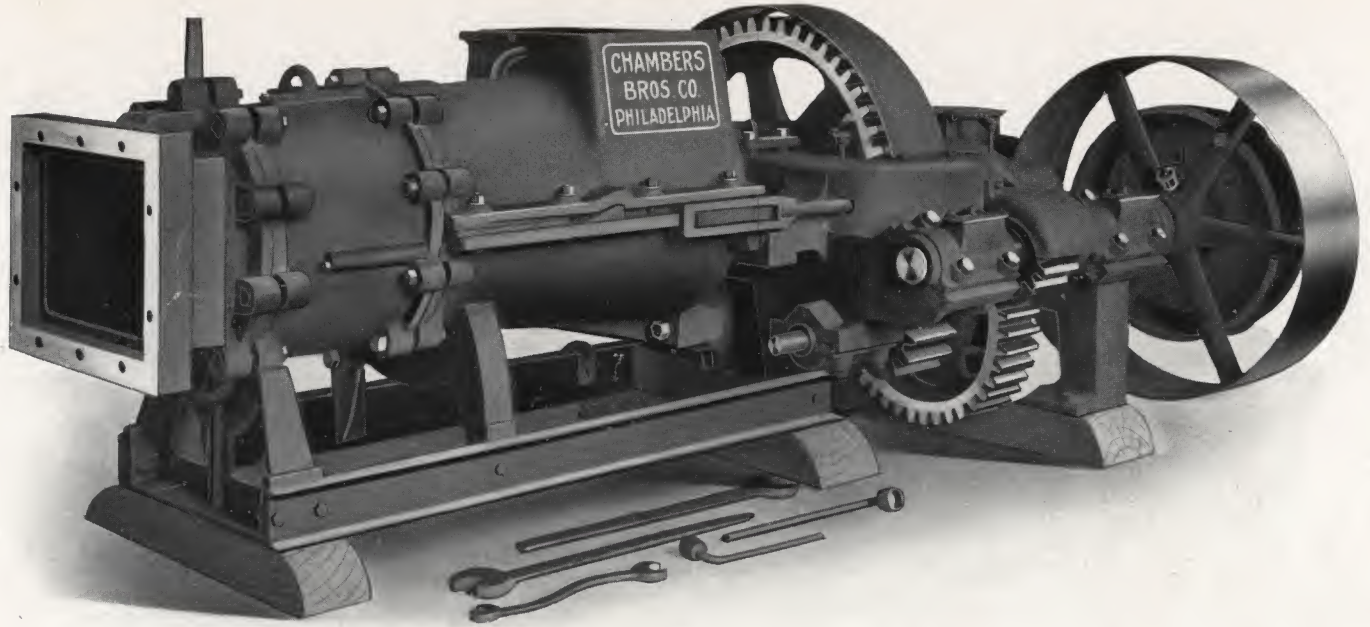
A double-geared machine having two cast-iron pug-shafts, each 7 inches diameter, forged steel knives with blades 8 inches long, boiler-iron tub 10 feet long, driving-shaft $2^{15}/_{16}$ inches diameter, friction-clutch pulley 40 inches diameter by 10½ inches face, with No. 7 clutch. Machine mounted on a framework of 6-inch steel channels, channel frame 4 feet 3 inches wide by 14 feet 10 inches long. Total length over all from outer end of driving-shaft to end of channels at the discharge end of the machine, 20 feet. Height from bottom of channel frame to top of tub, 2 feet 8 inches. Diameter of main spur gear, 3 feet 9 inches. Weight of machine, unboxed, about 12,000 pounds. Capacity. sufficient for No. 7 or No. 8 Brick Machine.

THE CHAMBERS DOUBLE-SHAFT HORIZONTAL GRANULATING AND FEEDING MILL, No. 13.

This mill has two 9-inch diameter pug-shafts arranged in the same horizontal plane and geared together, each carrying 40 steel-faced pugging knives secured by keys and adjustable to any desired angle with the shaft.

Depending upon the work to be accomplished, the mill is built with an independent boiler-iron tub for each pug-shaft (all arranged in one frame), or will be built with a single wide tub receiving both shafts, so located that the paths travelled by each set of pug-knives intersect.

The object of the first described construction may be illustrated as follows: bricks were to be made from a mixture of two kinds of clay,—one very strong, the other a weak clay. Under the method of receiving these clays at the machine house, a mixture in desired proportions could not readily be secured if left to the shovellers or feeders. Using our mill, the strong clay is dumped by the cart-load into one tub, and the weak clay into the other, with little regard to proportions so long as each is supplied. The knives in the two pug-shafts are each given a relative set representing the proportions desired. Both shafts making the same number of turns per minute, the mill discharges into a common receptacle a granulated mass of material made up of each kind of clay in exact proportions. This mill is very heavy and designed for hard work. It can be made to feed clay enough for 120,000 bricks per day.



FIRE-PROOFING SPECIAL. FOR LARGE SECTIONS.

Dimension drawing No. 66-D-83. The opening in die holder is 17 x 24½ inches.
The friction clutch driving pulley is 48 inches in diameter by 14½ inches face with our extra heavy No. 10 clutch.
Driving-shaft $4^{7}/_{16}$ inches diameter. Countershaft $5^{7}/_{16}$ inches diameter.
The main auger shaft through the machine is a hammered steel forging.
We fit this machine with cut steel gears, or with moulded gears, as customer prefers.
The opening for the admission of clay to the case is 19 by 25 inches.

The propellers are made of very hard material and are then ground smooth and polished so as to work through the clay with the least possible friction and power. They form a continuous thread on the shaft, being made in halves and the edges coming together so as to form a continuous spiral. These propellers are of a graduated diameter. At the large end of the case immediately under the hopper opening the propellers are 25 inches in diameter and are graduated to 22 inches in diameter at the commencement of the expressing screw. The screw is 22 inches diameter at the receiving end and 18 inches at the discharge end. This screw has a total of 1¾ turns in the thread. At the mouth, or where it receives the clay, it is what we term a single-thread screw but the last three quarters of the thread it becomes a double thread like a propeller.

The expressing screw comes quite close to the die holder, there being perhaps 1 inch or 1½ inches only between the end of the screw and the face of the die holder where it bolts to the screw case.

Clay-Grinding Machinery, Stone Extractors, and Clay Crushers.

For grinding shales, such as are generally used in the manufacture of street-paving bricks, and, in fact, all ordinary brick clays when dried sufficiently to pass through a screen, the Dry-Pan is probably the most successful machine in use.

It not only grinds, but also screens, the coarser particles being thrown back under the rolls for regrinding until made fine enough to pass the screen-plates which comprise a portion of the pan bottom.

A very popular size is our 9-feet diameter All-Iron and Steel Dry-Pan, shown in illustration, page 78. This machine is made wholly of iron and steel, is a heavy grinder, has large screening capacity, very large bearings, an improved form of step absolutely protected from dirt and running constantly in oil. The rollers have unusually thick, heavy tires, made of white iron, grinding against white-iron sectional plates. Particular attention has been given to ease of access to different parts, to reducing the wear to a minimum, and to the convenient renewal of wearing parts when necessary.

The grinding-rollers are 48 inches diameter by 12 inches face, and the combined weight of the two rollers with their shafts and boxes is about 13,000 pounds.

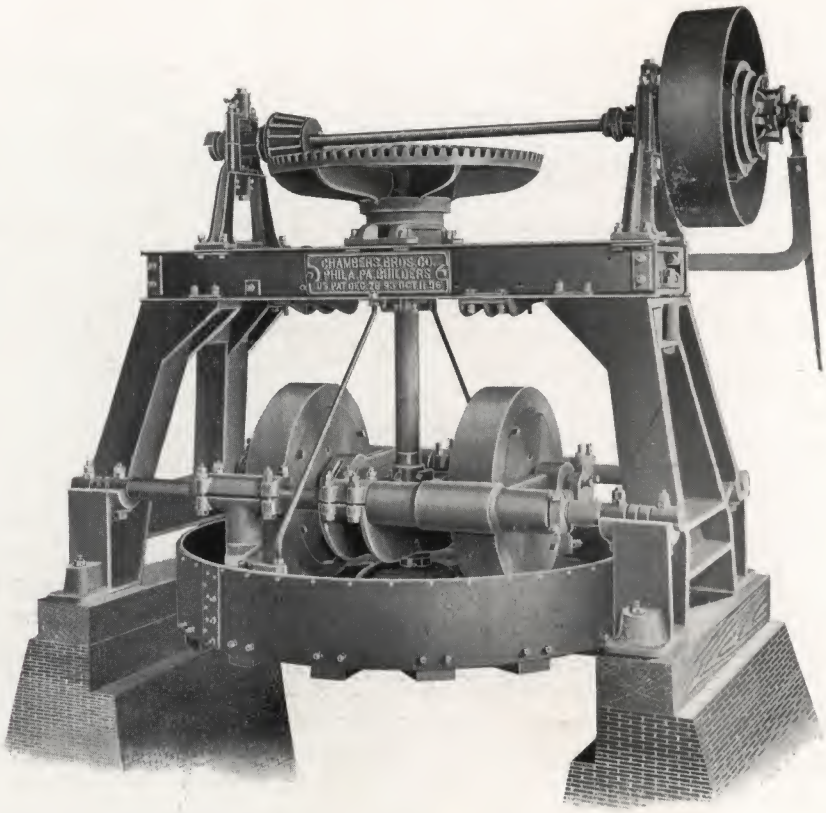
The whole machine weighs close to 40,000 pounds, and is fitted with friction-clutch pulley 40 x 12 inches on $3^{7}/_{16}$-inch driving-shaft.

The grinding-plates are 3 inches thick, and are made with babbitted pockets upon their under sides, which insure their setting perfectly true and level.

The ploughs or scrapers run close to the screens, and are so constructed that the portions subject to wear are easily and cheaply renewable.

The capacity is dependent entirely upon the nature of the material, its condition as to moisture contained, and the size of screen openings, for which we have different patterns.

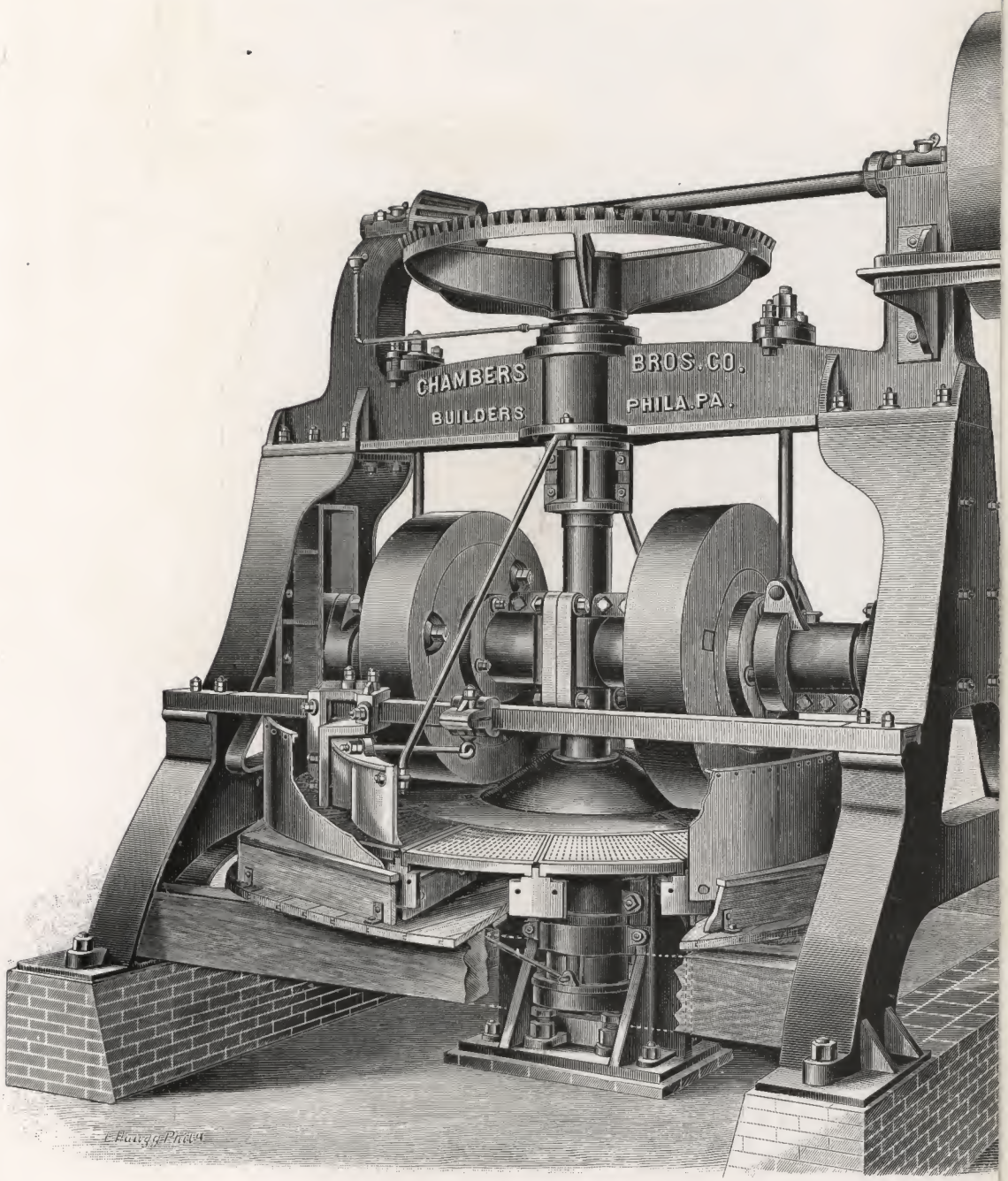
The inside of our heavy iron curb has an angle-iron rim riveted to its upper edge, which materially strengthens it and prevents overflow of fine material.



The Suspended Nine-Feet Diameter Pan, No. 2.

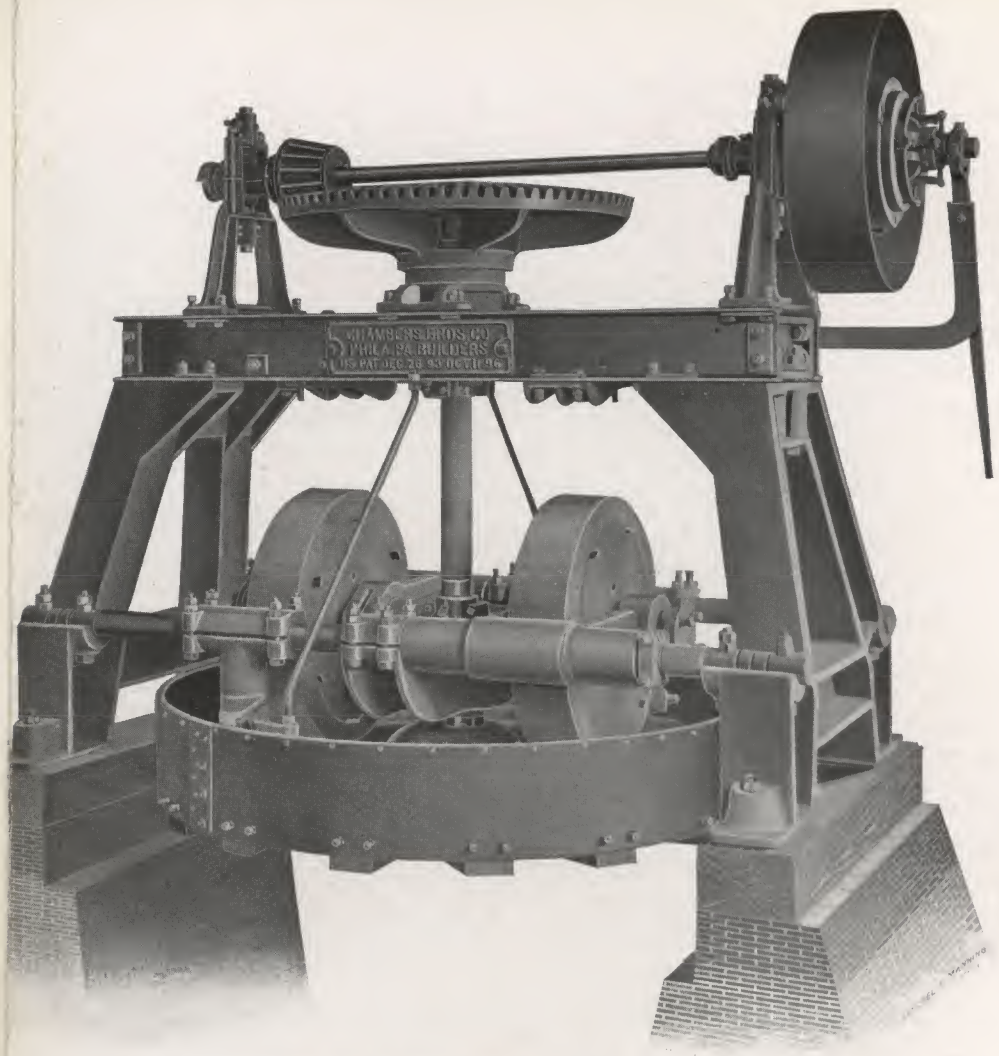
(Patented Dec. 26, 1893, and Oct. 11, 1898.)

In this design the usual underneath step-bearing and pier for its support is dispensed with. The main bearing suspending the pan is in the cross-head, made of steel I beams, entirely removed from the dirt and in a position easy of access. The vertical pan shaft is provided with adjustable babbitted bearings, and those of the driving-shaft are also provided with vertical adjustment, which is especially valuable since it enables the gears to be always in proper mesh. The grinding-rolls are held in independent arms, are 48 inches in diameter and provided with hard iron renewable tires. The design of the frame of this pan constitutes a double truss, with steel members top and bottom, and the entire elimination of the underneath step-bearing is an improvement much appreciated by experienced users of Dry Pans. This machine has adjustable steel toe and edge pieces on the ploughs, and has malleable iron screen-plates. As compared with the ordinary gray iron screens, the superior strength of malleable iron enables us to offer a greatly increased screening area for a given pan diameter, thus increasing the capacity in some cases as much as fifty per cent. We believe this pan stands without an equal. Will build tandem when desired.



Chambers's Nine-Feet All-Iron and Steel Dry-Pan, No. 1.

(See also the Suspended Nine-Feet Pan, No. 2, page 78.)



Suspended Nine-Feet Diameter Pan, No. 2.

Patented December 26, 1893, and October 11, 1898.

[COPY]

J. W. Sibley, Prest. & Genl. Mgr. J. A. Menge, Vice-Prest. & Treas. W. L. Sibley, Secy.

SIBLEY-MENGE PRESS BRICK CO.

BIRMINGHAM, ALA., May 22, '07.

CHAMBERS BROS. Co., Philadelphia, Pa.

Gentlemen:—When you ship the pan, please also send us one set of malleable iron screens for our large 9′ pan with openings 3/16″ wide same as originally furnished with that pan. The original set are still in good shape but the openings have worn a little too coarse. This pan has been in constant use for 16 months and we have not had to spend one cent on it in repairs as you know.

We are grinding both shale and fire clay. The absence of the troublesome step found with other pans has relieved us of one of the burdens that is most vexatious & costly to Clay Workers.

With best wishes

Yours very truly,

SIBLEY-MENGE PRESS BRICK CO.,

Per JNO. W. SIBLEY, *President.*

The use of the conical hopper to gather the ground material permits its discharge by gravity through a chute, and avoids the expense of constructing the usual stationary floor under the pan, the use of sweeps to discharge material, and the power and expense incident thereto.

The journal boxes on vertical shaft are easily removed without taking the shaft out.

The hangers supporting driving-shaft are in two parts, so this shaft may be easily lifted out.

The grinding-rolls are each mounted in a separate rigid yoke-arm swinging on a five-inch diameter shaft. This permits each roll to rise or fall without affecting the other and with less friction and wear than the ordinary sliding guides. Each roller is keyed to the middle of its shaft with journal boxes on both sides mounted in the yoke-arms. These journals are 4¾ and $5^{5}/_{16}$ inches diameter respectively. End thrust is provided for by a heavy plate on outer end of these journal boxes and also by the relative position of the roller shafts with the vertical shaft.

The machine is so arranged that the weight of the crushing-rolls may be carried upon heavy springs when the pan is empty or nearly so, and yet have their full weight upon the material when grinding. This avoids the unnecessary wear from having rollers run against pan bottom when empty. Independent adjustment of these springs is provided both for tension and for distance they will hold rollers above pan bottom.

The ploughs have the proper curve to sweep material under the grinding-rolls with least resistance, and are firmly secured and provided with adjustments for wear and position. Ploughs have renewable steel wearing strips, reversible steel toe-pieces with independent adjustments.

WEIGHTS.

The weight of each roller with its arm and short shaft is 6000 pounds, making 12,000 pounds for the two.

The MAIN HUB OR DISK casting of the pan weighs 3300 pounds.

TIRES on grinding-rolls are of hard white iron 10 inches face by 5 inches thick.

VERTICAL SHAFT is of steel 6 inches diameter.

DRIVING SHAFT is $3^{7}/_{16}$ inches diameter.

CROWN GEAR is 65 inches diameter, 7 inches face, 2¾ inches pitch.

SCREEN PLATES are of malleable iron, making them strong and securing greatest possible screening surface without sacrificing strength.

SIDE FRAMES each weigh 3000 pounds.

CROSS-HEAD is composed of two heavy section 12-inch steel I beams placed side by side on 26-inch centre measurement. These carry the weight of the running parts of the pan.

FRICTION-CLUTCH PULLEY is 40 inches diameter, 12½-inch face, of our flexible disk pattern. Speed of 187 R. P. M. produces 38 turns per minute of the pan. With shale in favorable condition this Pan is grinding from 7 to 8 cubic yards of material per hour, with a consumption of about 25 to 30 horse-power.

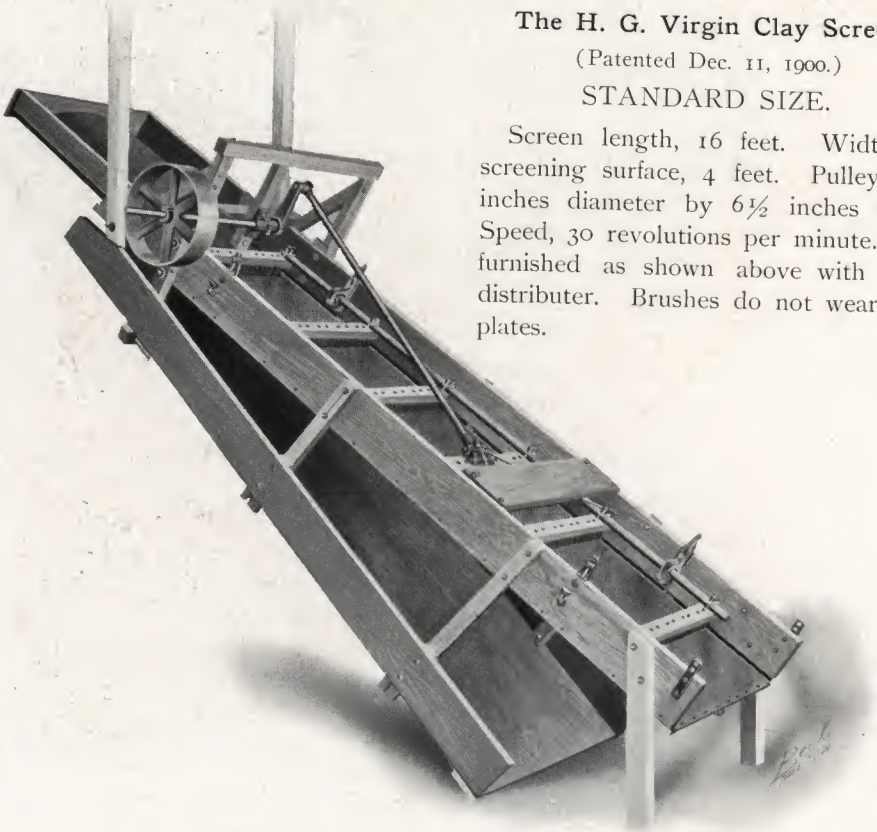
Piano Wire Clay Screens.

The mesh is made to suit customer's requirements, usually ten wires to the inch, giving an opening of about $\frac{4}{100}$ inches. Each set of wires fastened independently, permitting of easy adjustment.

MADE IN TWO SIZES.

For one pan, length 6 feet 2 inches, width 2 feet 4 inches. Screening surface 2 feet by 4 feet.

For two pans, length 7 feet 2 inches, width 3 feet. Screening surface 3 feet by 5 feet.

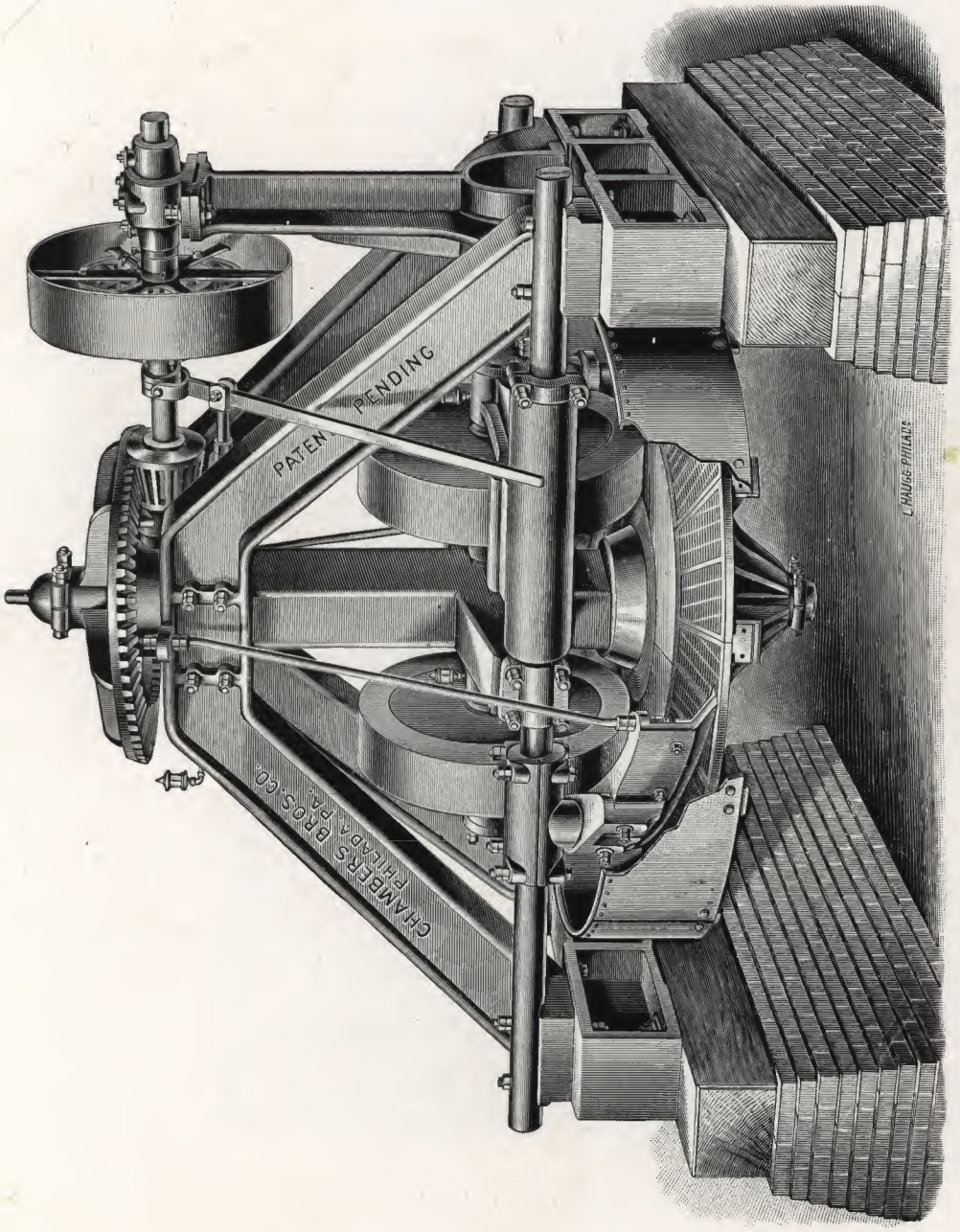


The H. G. Virgin Clay Screen.

(Patented Dec. 11, 1900.)

STANDARD SIZE.

Screen length, 16 feet. Width of screening surface, 4 feet. Pulley, 24 inches diameter by 6½ inches face. Speed, 30 revolutions per minute. Is furnished as shown above with clay distributer. Brushes do not wear the plates.



The Chambers Self-Contained Dry-Pan, No. 3.

(Patented Dec. 26, 1893, and Oct. 11, 1898.)

Seven and One-Half Feet Diameter Self-Contained Dry-Pan, No. 3.

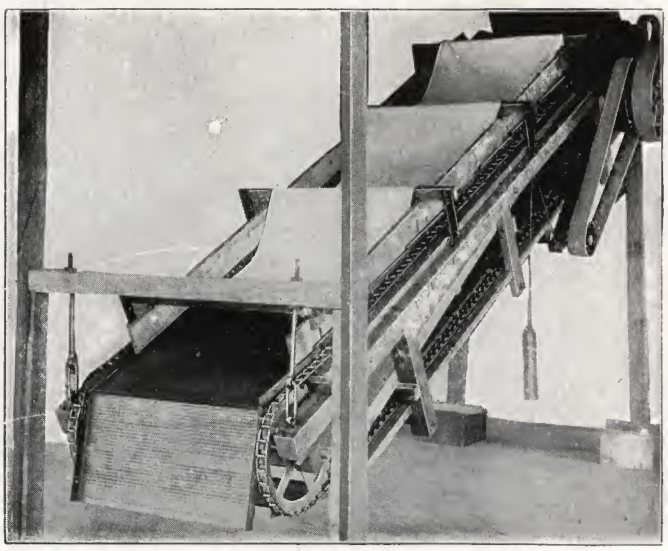
(See illustration, page 81.)

The grinding-rolls are held in independent arms, so that the position of one does not affect the other, and both have heavy white-iron tires. They are 40 inches diameter by 8 inches face, secured to their shaft by feathers, and are journalled in bearings having renewable sleeves.

The main shaft-bearings of the central post are oiled by an overflow from the step-bearing above as well as independently.

This pan weighs about 25,000 pounds. It is fitted with friction-clutch pulley 36 inches diameter by 8 inches face. The grinding-plates are 2½ inches thick and made with babbitted pockets upon the under side, which insure their setting perfectly true and level. The scrapers can thus be run close to the pan bottom. The heavy iron curb has an angle-iron rim riveted to its upper edge, which strengthens it and prevents overflow of fine material.

The Elder and Dunlap Clay Screen.

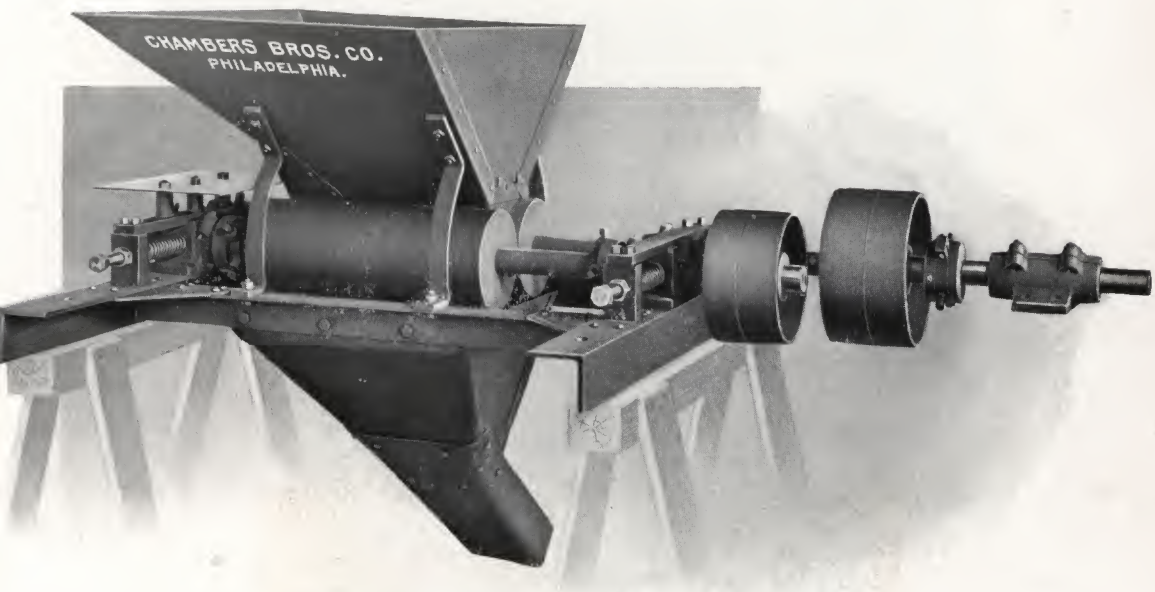


STANDARD SIZE.

Length, 16 feet; width over all, 5 feet 6 inches; weight, 1500 pounds; space, 13 feet in height by 13 feet horizontally; capacity, one 9-foot dry-pan. Special sizes to order.

Sand Grinding Rollers.

FOR STIFF MUD OR SOFT MUD BRICK MAKING.



Sand-Grinding Machines.

A common method of drying the sand used in brickyards for moulding or for the automatic sander on our brick machines is to bank it up in close contact with the end walls of brick kilns, resulting in much of it becoming lumpy.

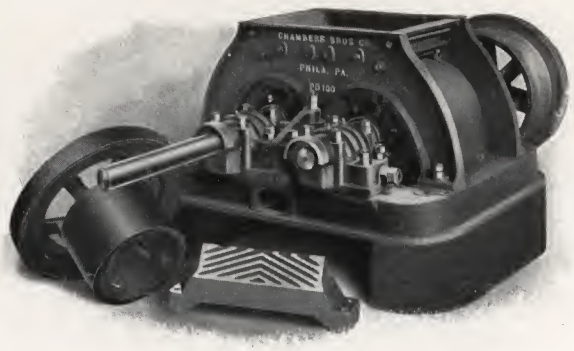
To reduce the lumps and screen the sand, we offer a special sand-grinding and screening machine, which does the work effectively and more economically than it can be done by hand.

These rollers are 8 inches diameter by 20 inches face. They are driven by independent belts, the journal boxes of one roller being provided with relief springs. They are sometimes constructed so that one roller can be given a lateral motion.

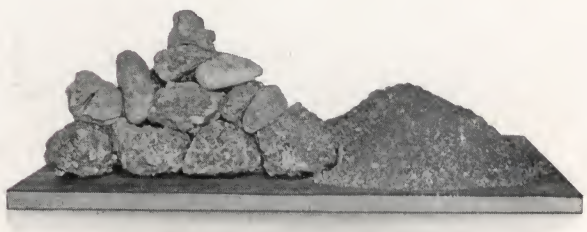
THE LINE

Clay Disintegrators or Grinders

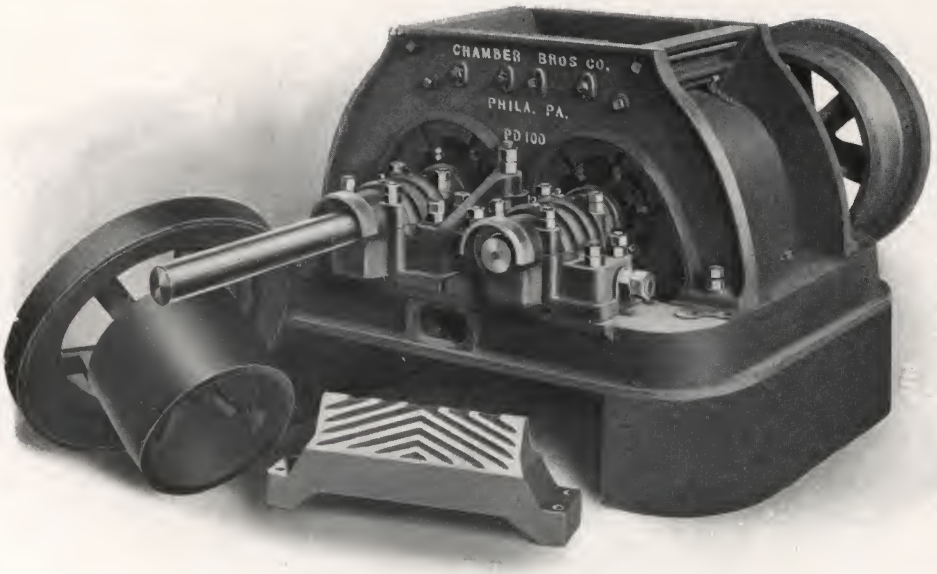
Will Prepare Clay, Wet or Dry, With or Without Stones, for Brick Making.



The Keystone Double Disintegrator.



The product of the Keystone.



(Patents pending.)

No. 30 Size Keystone Double Disintegrator.

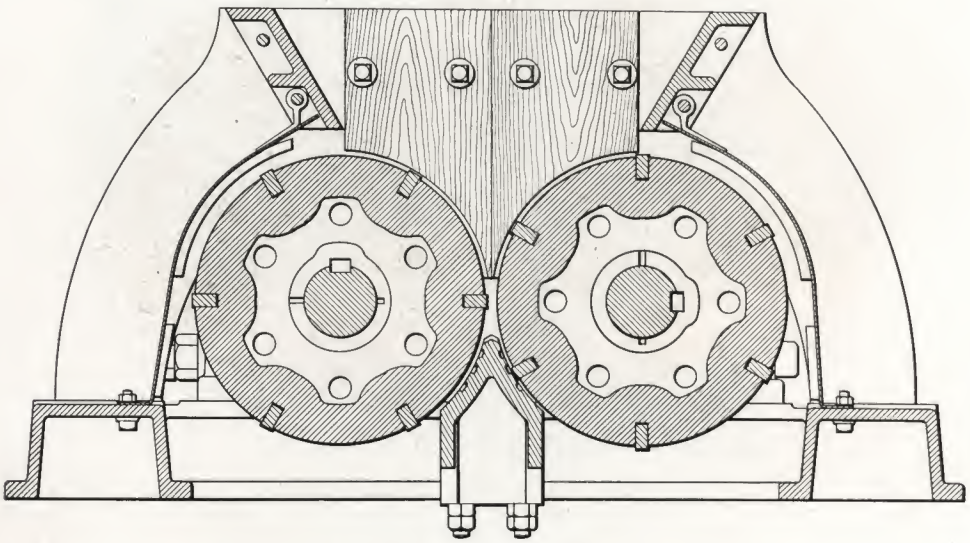
For grinding plastic materials, either wet or dry, and especially clays in which are imbedded small stones, pieces of ore, or shale, this new grinder possesses merit over any other grinder we are familiar with. In none of our trials have we been able to choke the machine or cause it to stick. It is a very rapid, free feeder, and has provision for adjustment to regulate the fineness of product.

It is a very valuable machine in the preparation of clays for the stiff mud and soft mud processes, as well as for the reduction of many materials other than clay.

It is strongly built, simple and with all parts easily accessible. The journals are of liberal dimensions, well protected, and fitted with continuous ring oiling devices.

Two revolving cylinders, running 600 revolutions per minute and upwards, according to size, have a number of hardened steel bars inserted and projecting slightly from the cylinder faces. These bars run in close proximity to a double faced grooved grinding block adjustably secured between the two cylinders and below their centres. The material is first crushed between the bite of the two cylinders, after which it is carried down by the projecting bars and ground against the hard faces of the grinding block.

No gears are employed, each cylinder having an independent belt wheel.



Cross Section of Keystone.

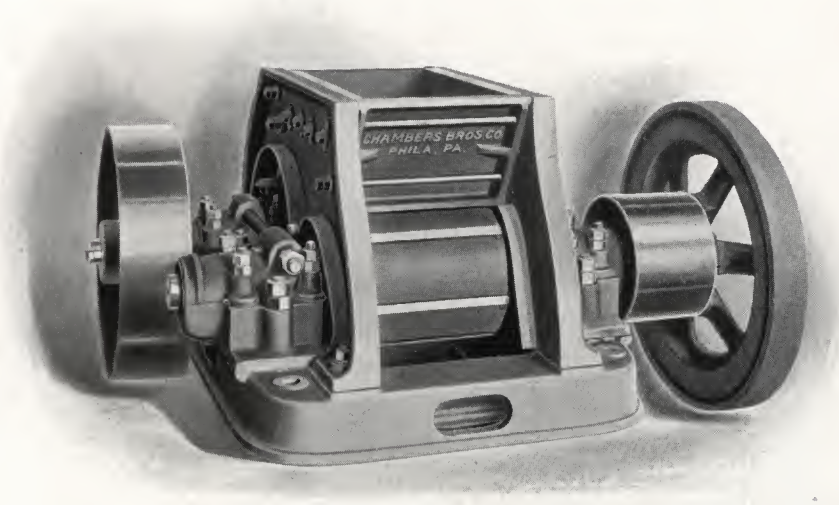
The steel bars are not only hardened, but are reversible and adjustable.

The grinding block is made of very hard material and so constructed that it may be renewed without serious expense.

Dimensions: No. 30 size Keystone. Rolls 18 inches diameter by 20 inches face. Capacity, 6000 bricks per hour and upwards. Uses driving belts 12 inches and 10 inches wide and should run about 600 revolutions per minute. Unboxed weight about 6000 pounds.

Dimensions: No. 25 size Keystone. Rolls 15 inches diameter by 18 inches face. Capacity, 4000 bricks per hour and upwards. Uses driving belts 10 inches and 8 inches wide and should run about 600 revolutions per minute. Unboxed weight about 4000 pounds.

Standard Pattern Clay Disintegrators.



Standard Pattern Clay Disintegrators.

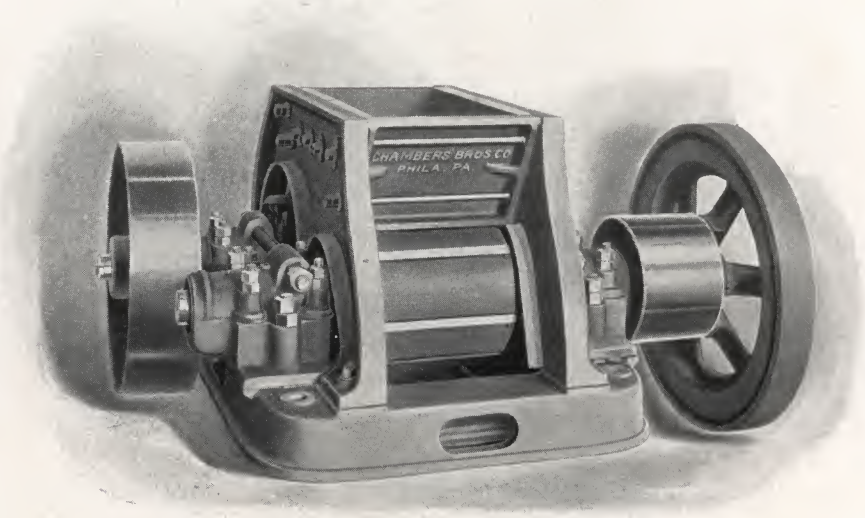
For the preparation of plastic clays carrying the moisture usually found in freshly dug surface clays our Standard Pattern Clay Disintegrators are very popular machines.

We build several sizes suitable for capacities ranging from about 2500 to 10,000 bricks per hour.

One roller is driven at a high speed, say 600 to 700 revolutions per minute, while the other acts merely as a feed-roll, and makes from 50 to 100 turns per minute. The essential feature, consisting of one or more continuous steel bars projecting slightly beyond the face of the fast running roll, not only insures a chipping action against lumps or strong, tough clays, but upon striking a stone causes it to be thrown out, as by centrifugal force, upon the opposite side of the feed-hopper from which the material is being fed. Stones weighing as much as seven pounds and smaller to the size of one-half inch in diameter have been thrown out by our Disintegrators. Small pebbles are crushed and ground up with the clay.

Among the superior features embodied in this Clay Preparing Machine, we invite attention to the broad heavy iron bedplate. The parting strain between the two cylinders is taken by two heavy through bolts passing from one journal-box to the other, and also affording means of regulating the distance between centres and the degree of fineness to which the clay may be prepared. All journal-boxes are made in halves, poured with the best babbitt-metal, and those

of the fast-running cutting cylinder are provided with oil-wells and means for keeping the oil flowing constantly over the journals whenever the machine is in motion. The surplus oil finds its way through channels at the ends of the boxes back into the oil-well again. Liberal dirt-caps are provided and protect all journals from dirt. The six steel bars projecting from the cutting cylinder are so made that two cutting edges of each bar may be utilized before it is necessary to renew them. An improved form of feed-box prevents escape of clay at the sides of machine.

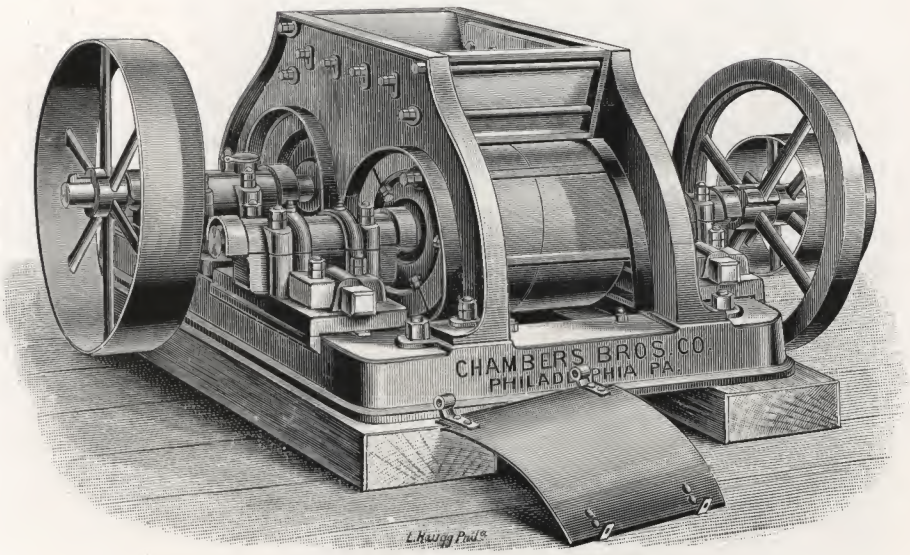


Chambers's No. O Size Clay Disintegrator.

Standard Pattern Clay Disintegrator.

No. 0 size has cutting roller of hard iron, 12 inches diameter, and fitted with six hardened reversible steel bars. Feed roller 20 inches diameter. Steel shafts, journal boxes made in halves and babbitted. Those on fast roller are ring oiling. Slow roller adjustable as to position. Bed plate of heavy box pattern. Tight fitting shoes in iron feed hopper.

Weight about 2700 pounds. Height from floor to top of hopper 27 inches. Bed plate is 37 inches wide by 50 inches long. Pulley on slow roller 24 inches diameter, 6 inches face; on fast roller 12 inches diameter by 8 inches face.

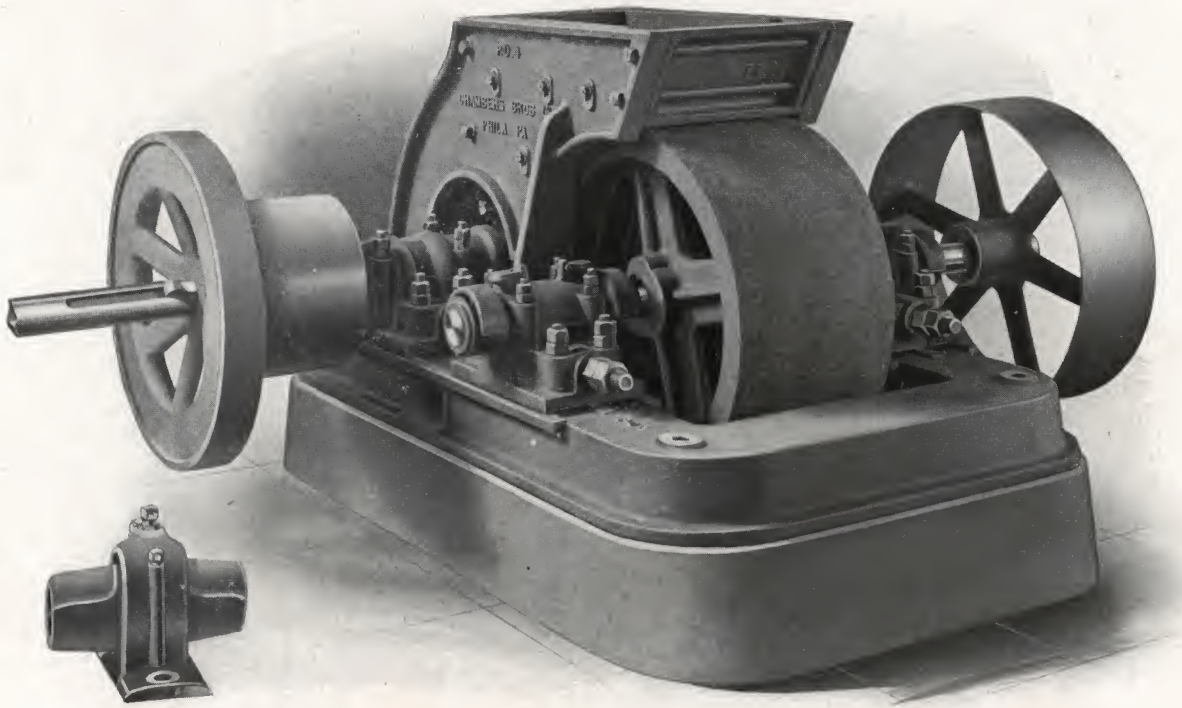


The Chambers No. 1 Clay Disintegrator

has both rollers 18 inches diameter by 16 inches face, the fast-running roller fitted with six hardened reversible steel bars.

It weighs about 4500 pounds, is a very solid, compact machine, and we believe has never been broken.

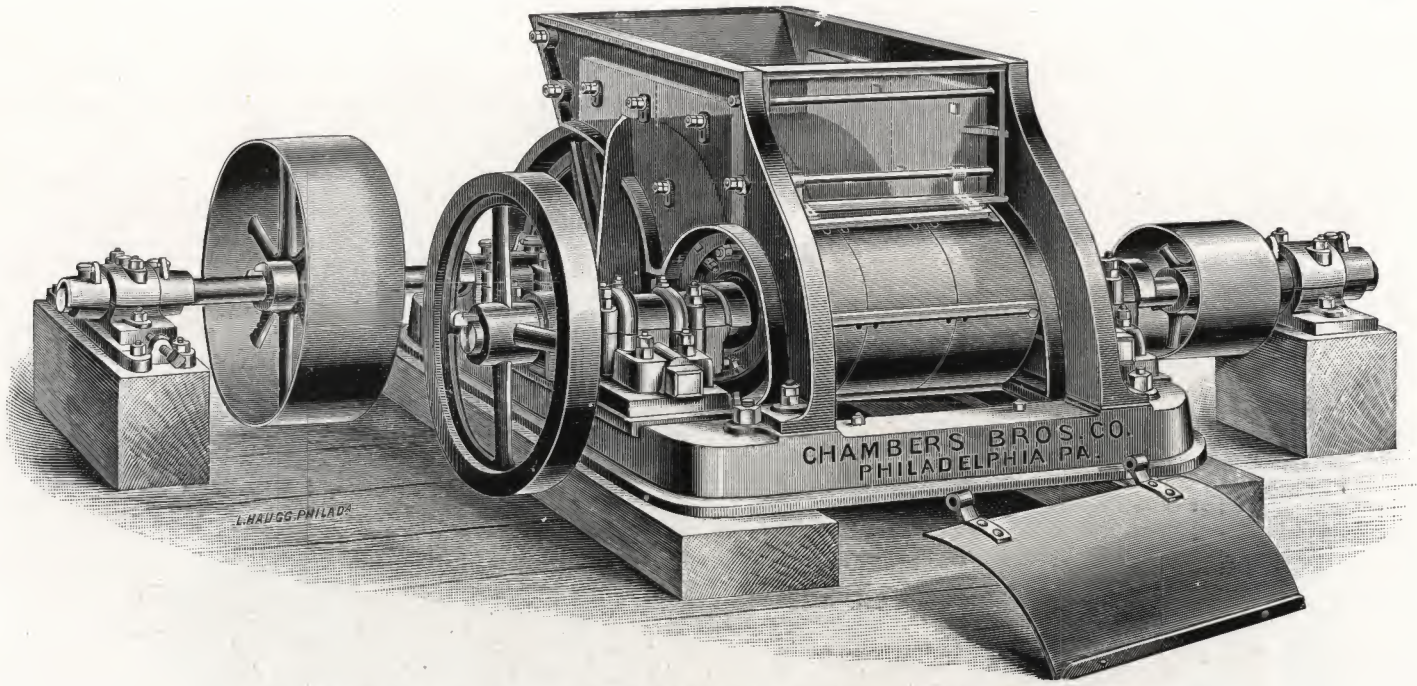
Height from floor to top of hopper 31 inches. Bed plate 48 inches wide by 60 inches long. Pulley on slow roll 30 inches diameter, 6 inches face; on fast roll 16 inches diameter by 12 inches face.



The Chambers No. 2 Special Clay Disintegrator.

This machine has feed-roller 30 inches diameter and fast-running roller 18 inches diameter, fitted with 6 steel bars. Weight is about 5100 pounds, and we guarantee it to have capacity to prepare clay for 5000 to 7000 bricks per hour.

Height from floor to top of hopper 37 inches. Bed plate 54 inches wide by 72 inches long. Pulley on slow roll 30 inches diameter, 7 inches face; on fast roll 16 inches diameter by 12 inches face.



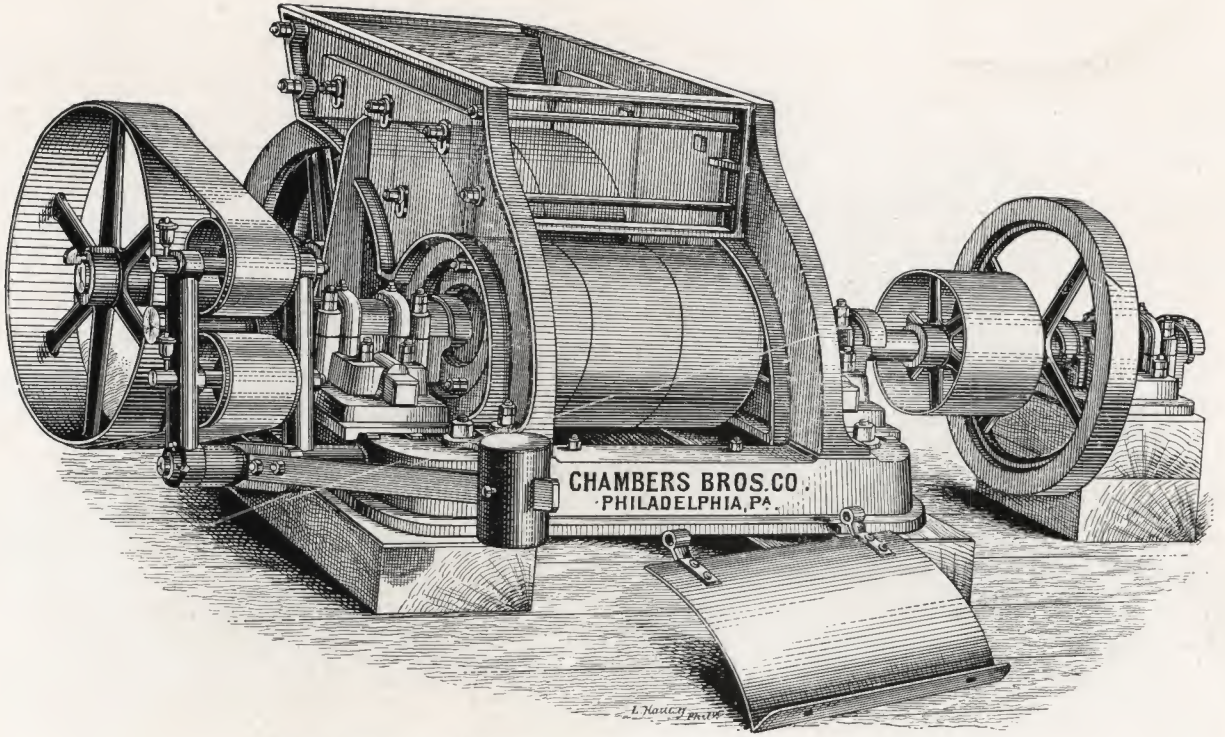
Clay Disintegrator, No. 2, manufactured by Chambers Brothers Company.

Only in special cases do we recommend a machine so wide as this, the rollers being 24 inches across the face, with diameter of 30 inches and 18 inches respectively.

The extra width necessitates outer bearings for ends of shafts, but aside from this feature the details of construction are the same as in No. 2 Special Disintegrator. Weight about 7000 pounds.

DISINTEGRATOR No. 3. Same style as No. 2, but has rollers 30 inches wide on face. Shafts are proportionately heavier. Total weight of machine, about 8200 pounds.

DISINTEGRATOR No. 4. Size and capacity of "No. 2 Special" but built under an unusual specification. Particulars upon application.



The Chambers Fine Grinder and Tailings Crusher.

This represents our Two-Roll Crusher, adapted for high speed and providing for a very large difference in surface speed of the two rolls, which may be perfectly true upon the face.

They can thus be close together, and the great difference in surface speed insures the greatest possible abrasive action upon the material to be ground. A feeding device, not shown in the illustration, distributes the material evenly over the whole face of the roll, insuring uniform wear.

This machine has been employed to grind clay containing lumps of iron ore varying in size one-half inch to three inches diameter. It does the work thoroughly, reducing the ore to particles like coarse sand, so that it can be mixed through the ground clay and add to the strength of the manufactured article, instead of being a detriment, as when in the lump state.

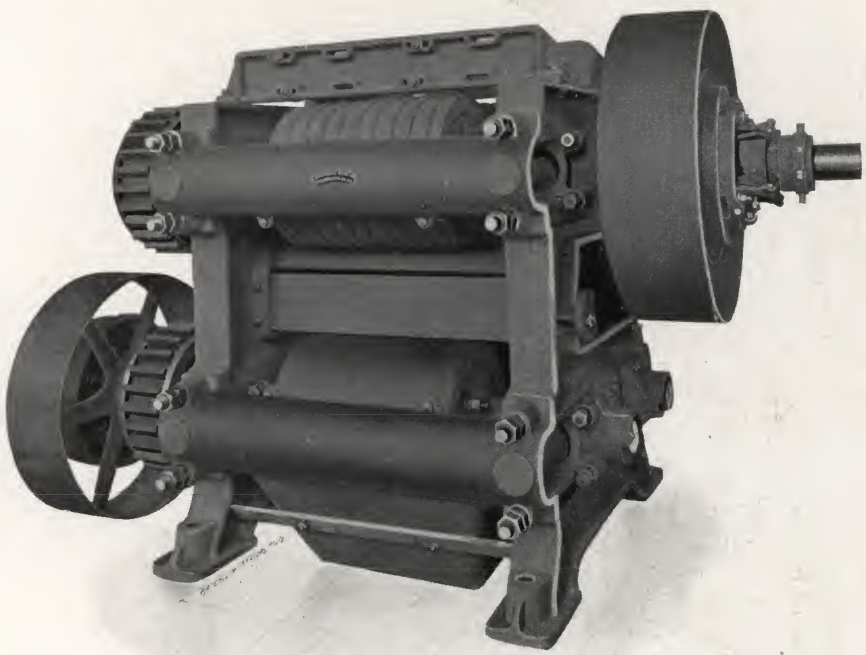
Compound Clay-Crushing Rolls.

In this machine both pairs of rolls are 20 inches diameter by 24 inches face, and are all made with our patent detachable shells, as illustrated on page 95. The upper rolls are designed to run as much as one inch apart, but may be set closer, if desired.

They are geared about 2 to 1, the driving-pulley being placed upon the shaft of the faster roll. Both rolls may be smooth face, or one of the pair may be studded with hardened steel bolts, as shown in the illustration on page 94, or with steel bars, as used on our disintegrators, shown on page 87.

The lower rolls can be run close together, and thus act as fine grinders on the material partially prepared by the upper set. The driving-shafts are 4 inches diameter, and are journalled in babbitted boxes of special construction so designed that neither the weight nor the strain incident to work comes on the parting line between box and cap.

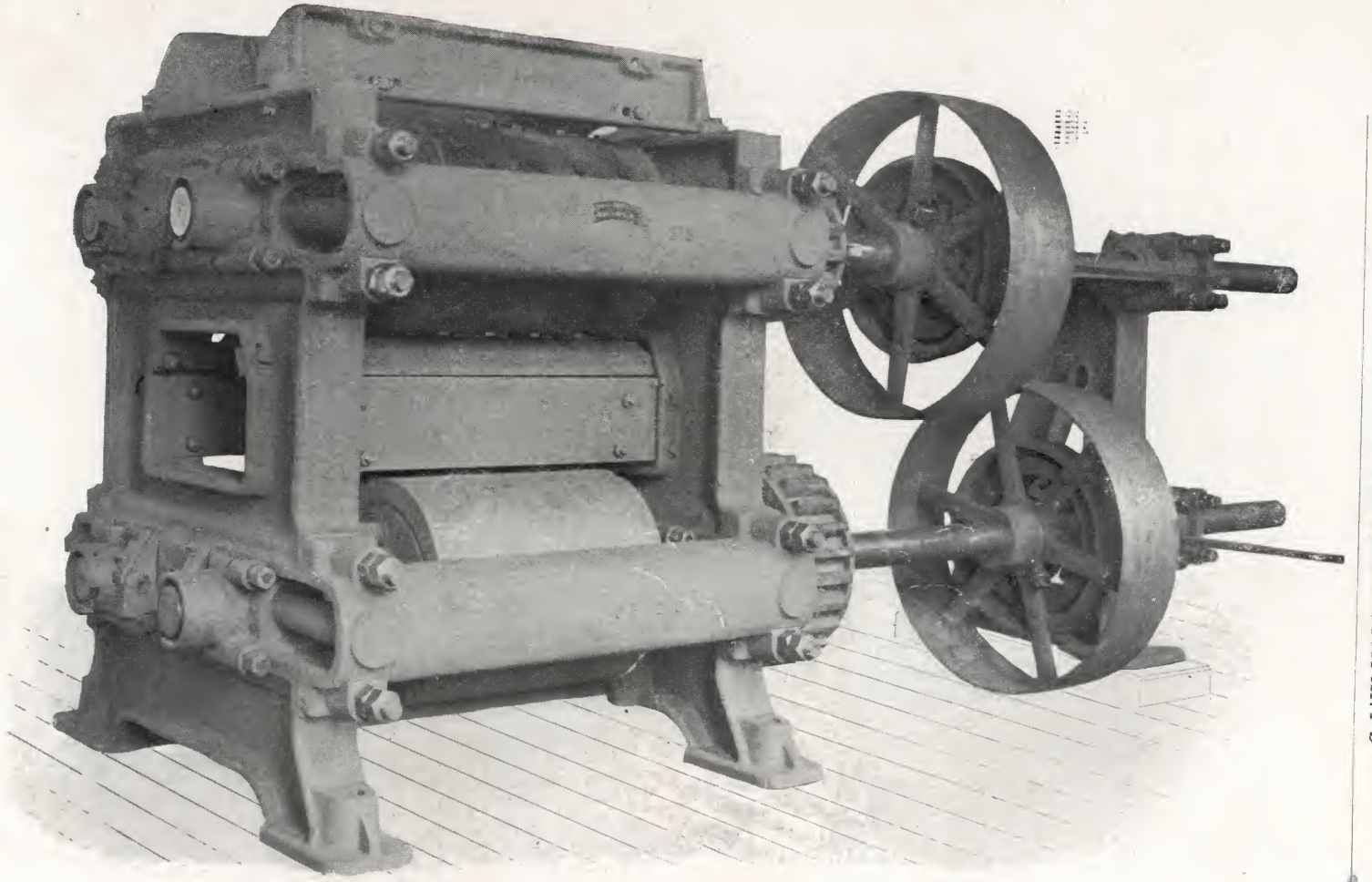
In addition to being thoroughly protected from dirt, these boxes are made with large pockets packed with greased waste. Either friction-clutch or plain pulleys may be used, those shown being 36 inches diameter by 10½ inches face. Heavy coil springs are placed behind the journal boxes, one roll in each pair, to afford relief when necessary.



Compound Clay-Crushing Rolls with Short Shafts.

SHOWING SCREW THREADS ON FACES OF UPPER ROLLS.

Driving-pulleys close to journal-boxes and upper rolls fitted with shells having screw threads for removing stones from clay.



The Chambers Compound Clay-Crushing Rolls.

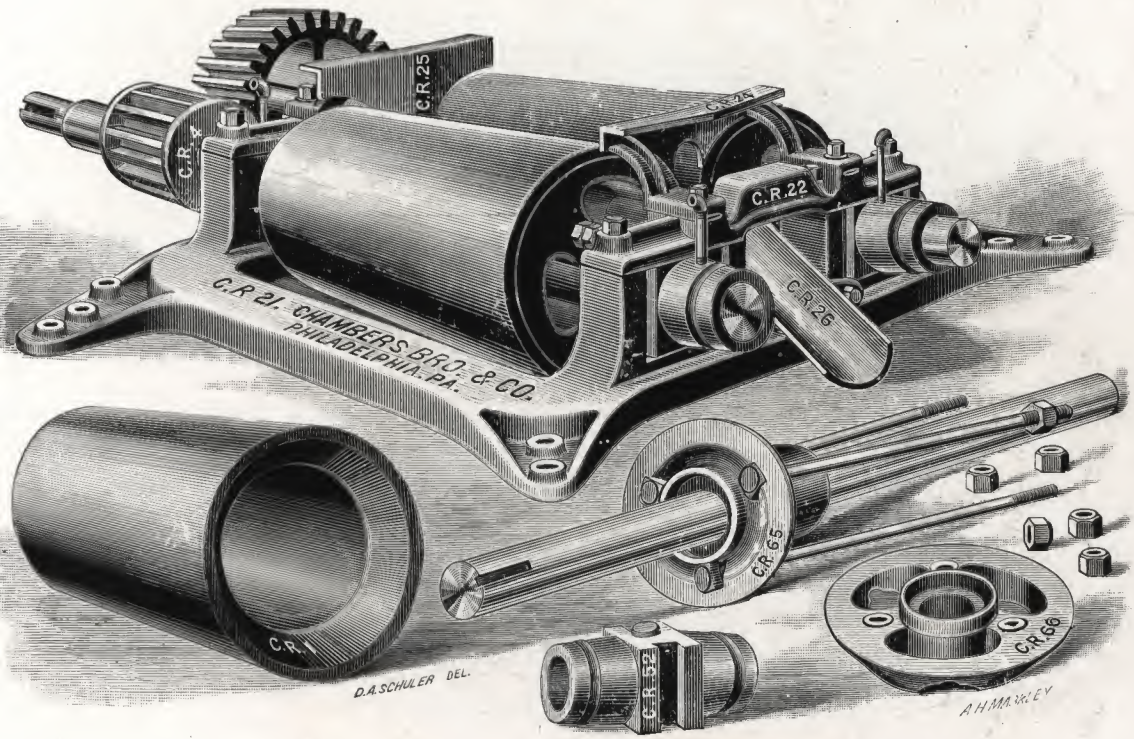
SHOWING SPUDS IN FACE OF UPPER ROLL.

Weight of machine as shown, about 15,000 pounds.
Height from floor to top of hopper, 5 feet 7 inches.
Floor-space, including gears, but exclusive of driving pulleys, is 5 feet 3 inches wide by 6 feet long.
When the application of power requires it, we build this machine with long driving-shafts and provide a mounted pedestal with babbitted bearings.

Single Conical Clay Rolls.

For preparing loamy clays and for extracting limestone pebbles and boulders, we have found the conical-shaped single rolls give good results. The rolls may be adjusted to run from one-quarter to three-quarters of an inch apart, and the increasing diameter throughout their length causes the larger water-washed pebbles to move towards the end having largest diameter, where they are discharged through a suitable spout. Very small stones are crushed with the clay.

We build these machines of different sizes, and to suit various locations with other machinery. They are all constructed with our patent detachable shells, which afford a convenient means of renewing the part subject to wear without affecting other parts. These shells are made of very hard metal and the best material known to withstand the abrasive action of grit and stones.



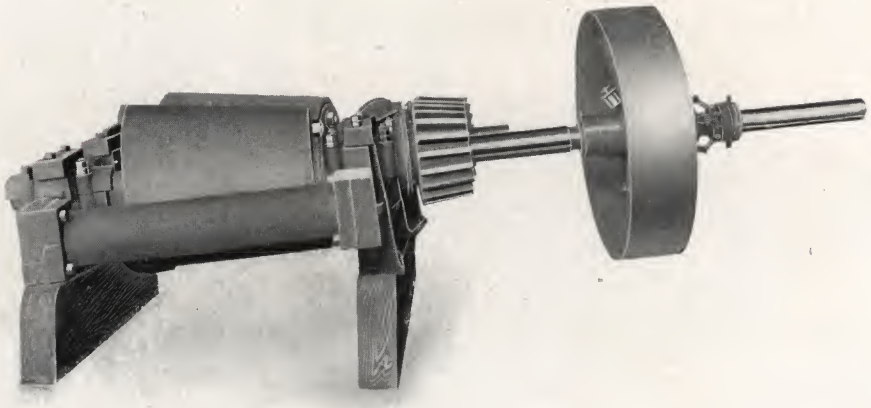
Chambers Brothers Company's Conical Rolls, with Detachable Shells. Size No. 3.

Rolls are 24 inches long on face, 18 inches diameter at large end, and 15 inches diameter at small end. Supplied with friction-clutch pulley 30 x 6 inches. Longer shaft with fly-wheel and outer bearing for end of shaft furnished when desired. Weight, about 4100 pounds.

Special No. 1 Single Crushing Rolls.

Built with differential gear, or to run both rolls at same surface speed as preferred. Rolls adjustable, gearing 8 inches wide and very heavy. Journal-boxes in self-contained iron frame, secured to wooden framework of 12 x 14 inch hard wood. Rolls are 24 inches long on face, 33 inches diameter at large end, and 30 inches diameter at small end.

No. 2 Size Single Conical Crushing Rolls.

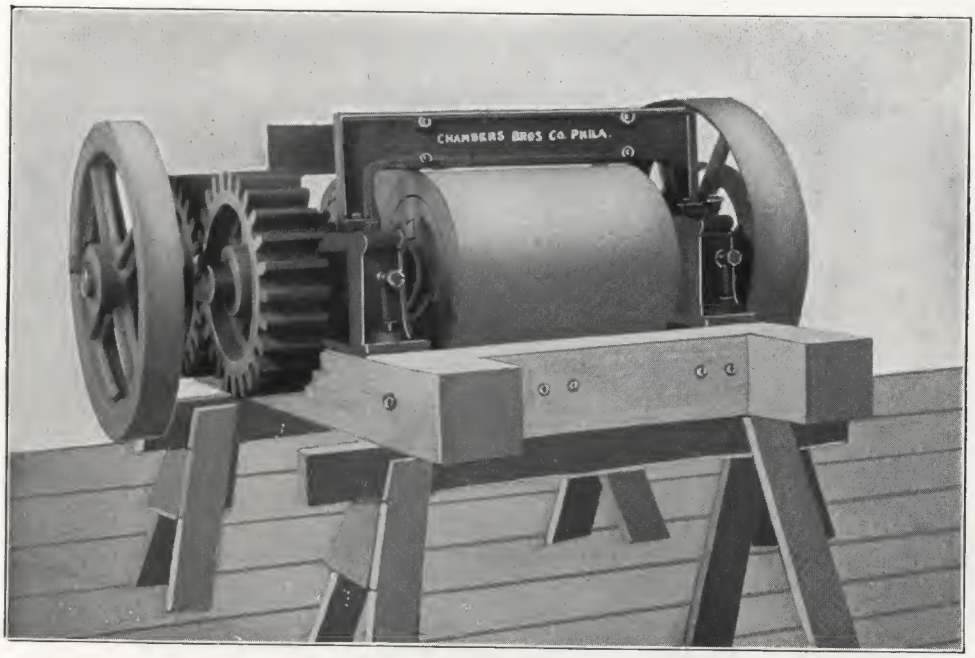


Constructed in the same manner and embodying the same features as described in No. 3. Rolls are 24 inches long on face, 22 inches diameter at large end, and 16 inches diameter at small end. Supplied with friction-clutch pulley 36 x 7 inches.

This size is made with frame of two patterns, one in which the shafts are horizontal, as they are shown in illustration of No. 3, page 95. The other pattern so as to elevate one end of the roll shafts and leave the upper faces of the rolls level. This position is thought to facilitate the discharge of stones, but to keep the driving-belt on the pulley greatly limits the location of the machine in erection. Weight, unboxed, about 5800 pounds.

Screw-Threaded Shells for No. 2 Rolls.

We can supply the No. 2 size rolls with right and left screw-threaded shells for discharging stones. See illustration, foot of page 98.



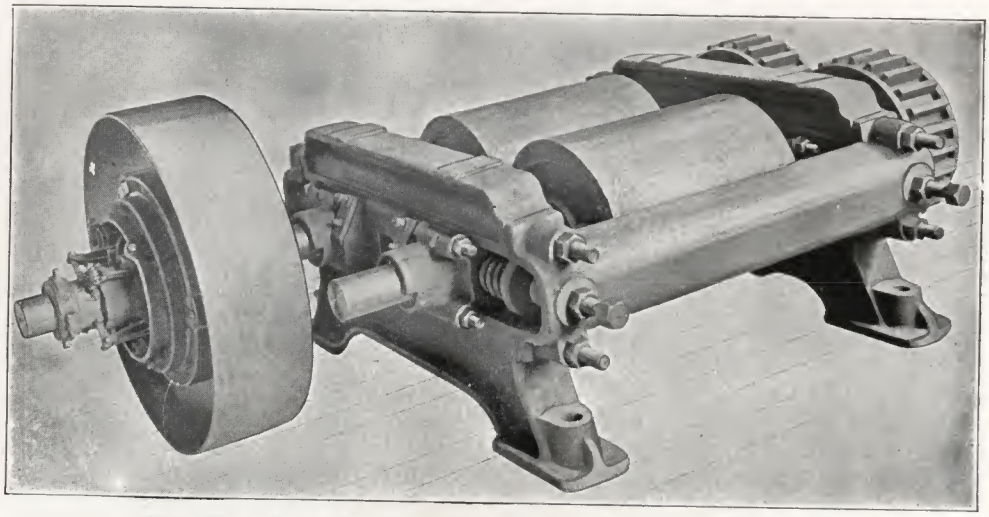
No. 5 Straight-Face Rolls without Spring Boxes.

Straight-face Crushing Rolls, made with removable shells, 24 inches long by 20 inches diameter. Gears, 6 inches face; shafts, $3^{7}/_{16}$ inches diameter. Long journal-boxes, mounted in self-contained iron frame, secured to framing of 8 x 8 inch hard wood.

Are provided with an iron feed-box, with adjustable scrapers. Rolls may be set to run from ⅛ to ½ inch apart. With fly-wheel and 36 x 7½ inch friction-clutch pulley. Weight, about 4950 pounds.

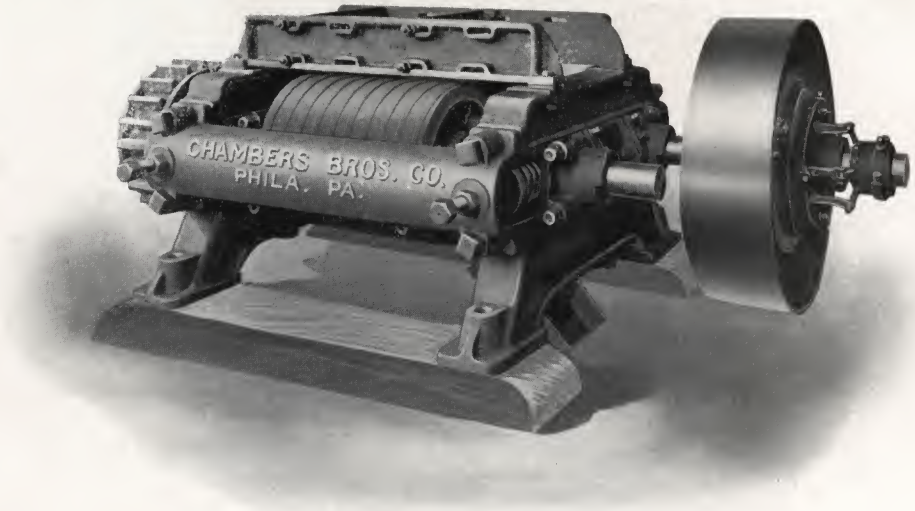
No. 6 Straight-Face Rolls without Spring Boxes.

Same design and embody same features as No. 5. They are 21 inches long by 14½ inches diameter. Are provided with iron feed-box, fly-wheel, and friction-clutch pulley 30 x 6 inches. Weight, about 3100 pounds.



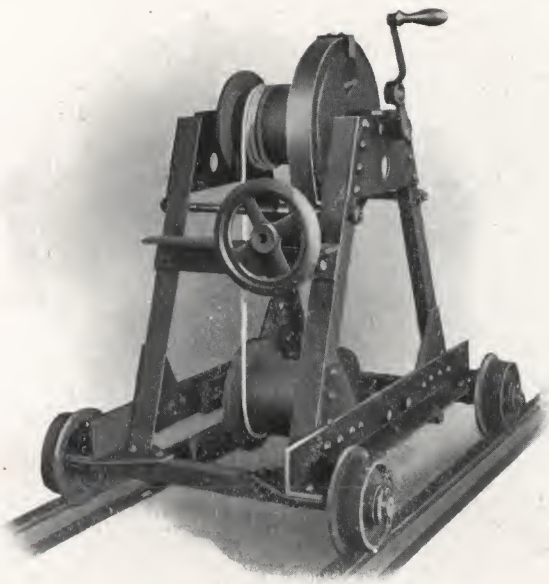
The Chambers Straight-Face Rolls with Spring Boxes.

The Rollers are 20 inches diameter by 24 inches face. Are exceedingly hard and so constructed that the shell or grinding surface may be renewed without renewing the whole roll. Shafts are 4 inches diameter with babbitted journal-boxes of special construction. One roller is held in place by very heavy adjustable coil springs. Gears are shrouded. Friction-clutch driving-pulley 36 inches diameter. Weight, unboxed, 7250 pounds.



The Chambers Straight-Face Rolls, No. 8.

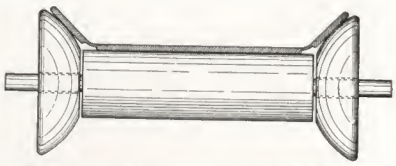
In this machine the shafts are 4 inches diameter, with babbitted journal-boxes made in halves and self-oiling. The hard iron roller shells are screw-faced, causing all of the larger stones to be discharged at the ends. Heavy adjustable coil springs hold one roller in place. Clutch driving-pulley 36 inches diameter. Weight, unboxed, about 7500 pounds. This is a very successful preliminary clay-preparing machine for certain materials.



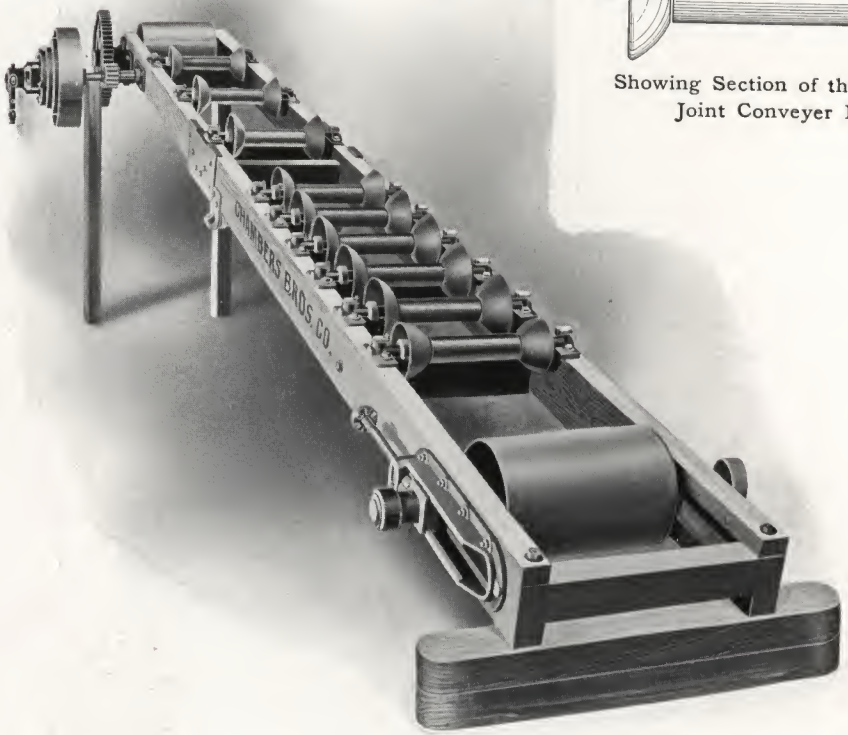
Special Design of Portable Winch.

Mounted upon wheels for convenience in moving from place to place. Fitted with a friction brake band operated by hand wheel. The machine is not a hoisting winch, but is designed to control the lowering of material on trucks or cars. Drawing No. 88-C-116.

Chambers Belt Clay Conveyers and Elevators.



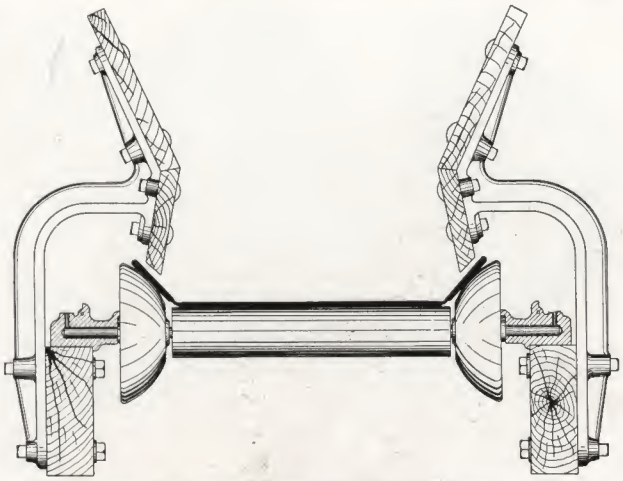
Showing Section of the Flexible Joint Conveyer Belt.



This illustration shows the framework and machinery of a Belt Clay Elevator of pattern that we have now tested for three years with pronounced success. The belt is omitted from the illustration to better show the form of roller, but is made especially for this use and has a flexible joint running lengthwise of the belt and about four inches from each edge.

The belt thus easily conforms to the flat trough shape required by the rollers and prevents any spilling of clay over the edges. We are enabled to dispense with the usual side boards extending the entire length of elevator, designed to prevent spilling, but never very efficient and one cause of much wear on the belt. The friction-clutch pulley used is 24 inches diameter. When making 125 revolutions per minute, the conveying belt travels about 120 feet per minute.

The rollers are made of 3-inch diameter steel pipe with finished iron gudgeons 5/8-inch diameter running in bored boxes having one end closed and fitted with self-closing oil lids. These boxes are adjustable as to position and are lipped over the edge of the side timbers. At each end of the pipe rollers are cast-iron carved flanges of large diameter having bored holes and arranged to run free on the roller gudgeons. This obviates any wear whatever on the conveyer belt, keeps the clay in the central part, and delivers it in an even, compact flow over the upper drum. The drums are journaled in babbitted boxes made in halves: are both provided with adjustable scrapers. The lower drum has adjustable take-up boxes to conveniently take up slack of belt. The framework is of 3 x 8 inch dressed yellow pine, thoroughly well braced, and the different sections secured by substantial iron lipped plates.

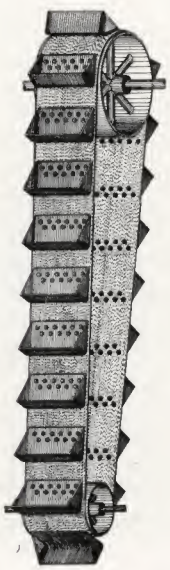


Showing Arrangement of Feed-Hopper Over Lower End of Flexible Joint Conveyer.

The elevators are made for either 18-inch or 24-inch wide belts, of any desired lengths, are fitted with either spur or bevel gear, and with friction clutch pulleys.

We have various forms of feed hoppers placed over the belt at the lower end of the elevator at the point where clay is fed by shovel or from crusher or granulator.

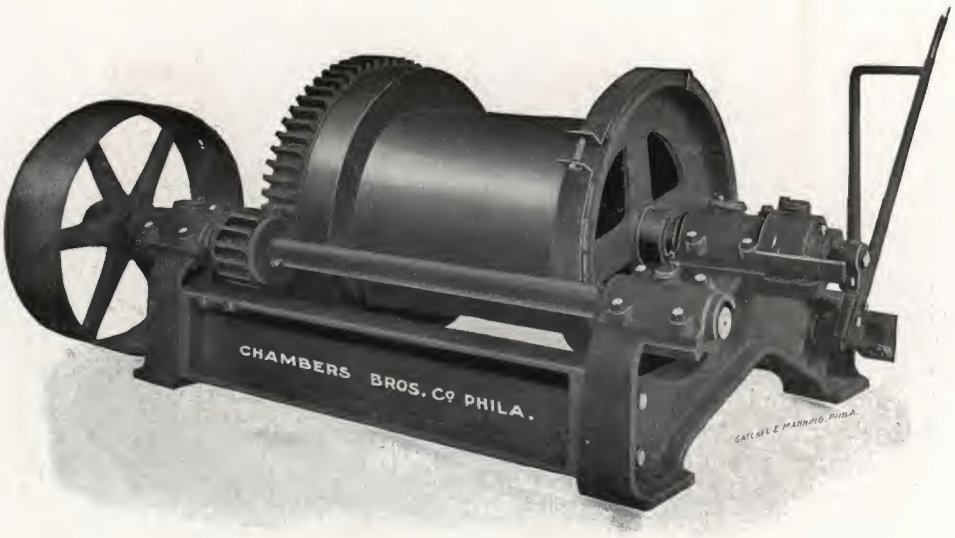
These are designed to suit each local condition.



Bucket Elevators.

We also furnish bucket elevator machinery where conditions require the use of this pattern.

The overhead machinery is in babbitted boxes, and we recommend the traction wheel instead of sprocket for driving the chain. These have turned rims, and the grip is ample to do all the work that either buckets or chain should be called upon to do. We also supply these elevators with buckets fastened to cotton belts. Overhead driving-gear is fitted with friction-clutch pulley, plain pulley, or sprocket and chain, as desired.



Iron-Frame Heavy Friction Hoist, No. 1.

This is a very strong, well-built machine, embodying principles that have been successfully employed in the best machinery of this class for many years. Drum, 24 inches diameter by 29 inches between flanges.

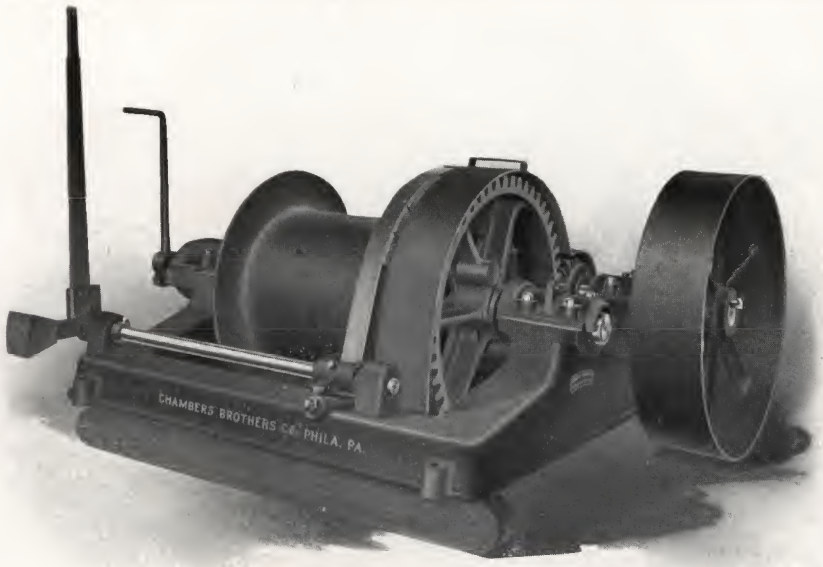
The friction in head of drum works in a double **V** groove and utilizes both sides of the friction blocks for drive purposes.

The gear is 4½ inches face and of large diameter for size of drum. Driving shaft is $2^{15}/_{16}$ inches diameter, and all journal boxes are made in halves and babbitted. The clutch mechanism is provided with a positive throw-out, so that the drum is sure to stop when friction lever is thrown out. The thrust screw works in a phosphor bronze nut. Brake-band lever is counterweighted. Weight of machine, unboxed, is 4500 pounds. Drive-pulley is 30 inches diameter, 9½ inches face. Will carry 2,000 feet of ⅝-inch diameter rope.

Floor-space of frame, exclusive of operating levers, is 6 feet 6 inches by 4 feet 10 inches, including pulley and shaft space 7 feet 2 inches by 4 feet 10 inches.

An iron gear shield is included, although not shown in cut.

When raising a loaded car of 1½ cubic yards' capacity up a 15 per cent. grade at a speed of about 350 feet per minute, this machine requires 10½ horse-power.



Iron-Frame Friction Hoist, No. 2.

This is built on the same lines as our No. 1 Hoist, but is of smaller size.

Box pattern bed plate is made in one casting.

The frictional device is practically the same as on our larger hoist.

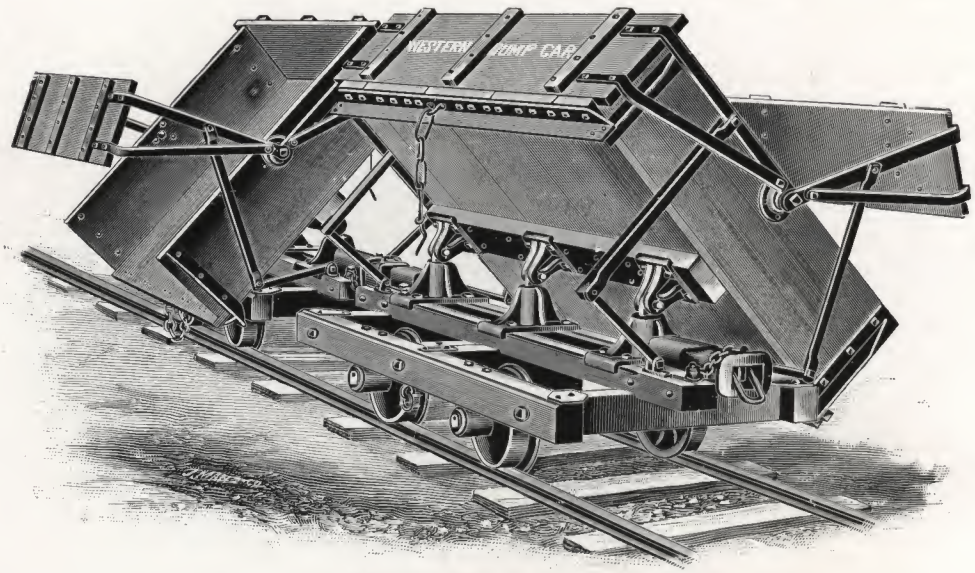
The drum is 17 inches diameter by 19 inches width between flanges and has capacity to carry about 2200 feet of $^{7}/_{16}$-inch diameter wire rope.

It has good, strong, heavy gear, driving shaft is $2^{7}/_{16}$ inches diameter, and is fitted with pulley 30 inches diameter by 6½-inch face.

The brake band is faced with end grain maple blocks and has counter-weight to insure its throwing off promptly. Rope speed from 220 to 330 feet per minute.

The hoist is ample to pull one loaded 1½ yard clay car at a time on a 15 per cent. grade. Unboxed weight is about 2500 pounds.

A Shop Line of No. 2 Friction Hoists.



Western Dump Car.

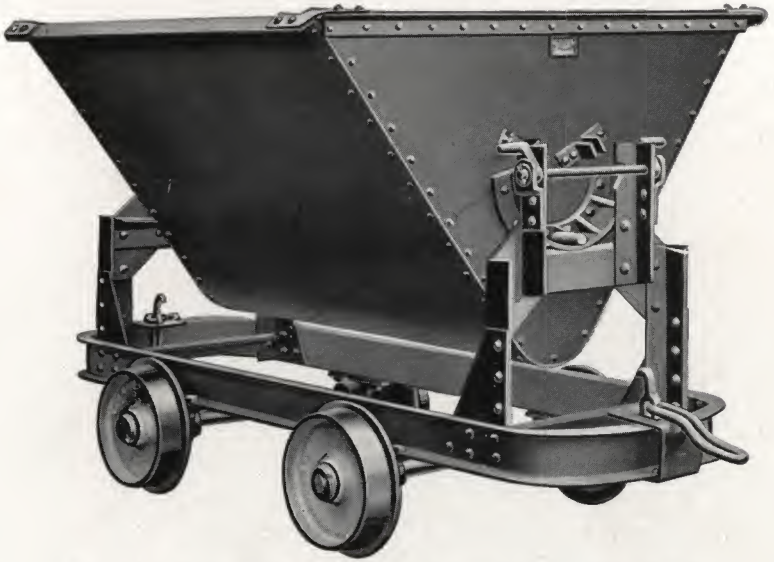
Our standard car has capacity of 1¼ cubic yards, and is 24-inch gauge; the wheels are 12 inches diameter, and made of the best car-wheel iron, the face being smooth and properly chilled; axles of 2-inch steel with bronze journal bearings, 1⅞ x 4½ inches; improved journal-boxes and improved spring couplers. White oak timber is used throughout.

The side-boards are protected at each end from splitting by a plate of steel bolted under the side-arms and braces. Weight, about 1400 pounds.

The height of the top of the 24-inch gauge car, with capacity of 1¼ cubic yards, is 42 inches above the top of the rail it stands on. This is no higher than other cars of 18-inch gauge, while the bed, in dumping, assumes a more nearly perpendicular position in the Western than in any other car. The Western dumps at an angle of 48 degrees from the horizontal, while other makes of cars have a dumping angle of about 43 degrees. Contractors will recognize the advantage of the wider gauge, as lessening the danger of the car being thrown off the track in dumping, and in the economy of keeping the track in good condition.

Stock Sizes of Western Dump Cars.

		Approximate Weight, Unboxed, in lbs.
1¼ yard	Wooden Frame Side Dump Car	1,400
1¼ "	Steel " " " "	1,500
1½ "	Wooden " " " "	1,800
1½ "	Steel " " " "	1,950
2 "	Wooden " " " "	2,400
2 "	Steel " " " "	2,800
3 "	Diamond Framed Car	5,000
4 "	" " "	6,000



No. 240 Either Side Rocker Dump Car. All Steel.

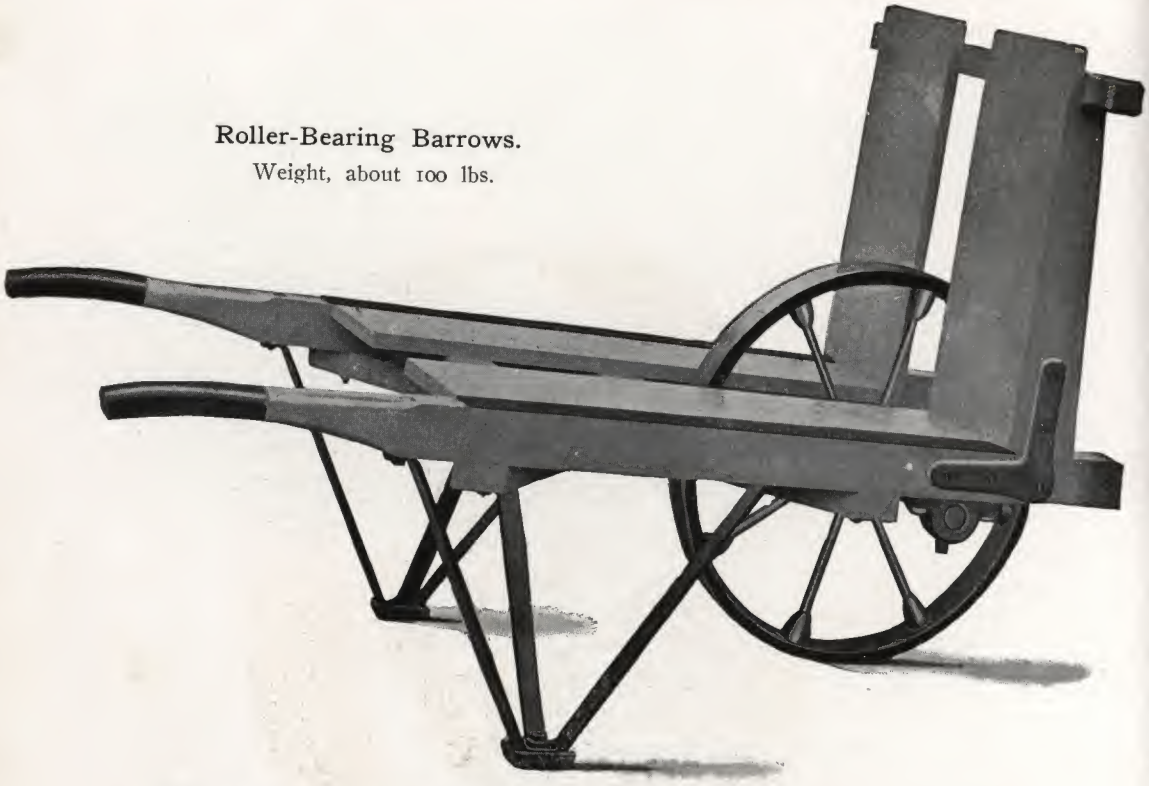
STANDARD DIMENSIONS.

	1 YARD	1½ YARDS	2 YARDS	3 YARDS
Length over all,	6 ft. 2 in.	6 ft. 8 in.	8 ft. 1 in.	10 ft.
Width over all,	4 ft. 10 in.	5 ft. 4 in.	6 ft.	6 ft.
Height from top of rail,	3 ft. 9 in.	4 ft. 3 in.	4 ft. 5 in.	4 ft. 10 in.
Gauge,	3 ft.	3 ft.	3 ft.	3 ft.
Weight,	950 lbs.	1350 lbs.	1750 lbs.	2610 lbs.

The body is made in one piece (except ends) of steel plate, reinforced with angles in corners and along edges. Frame is steel channel and **I** beam. Rockers and Ys are heavy malleable or steel castings. Bearings are self-oiling of bronze. Wheels are of steel or cast iron, 14 inches in diameter. Furnished with brakes and drawbars, or spring bumpers, as required.

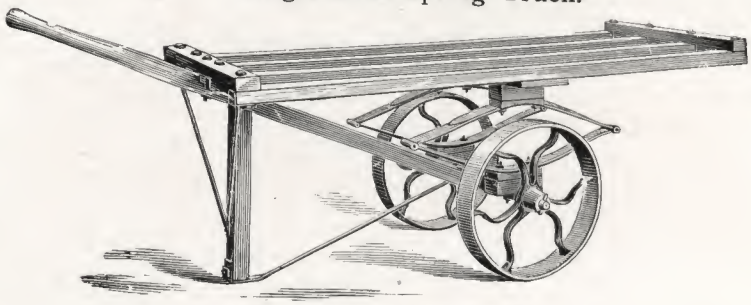
Roller-Bearing Barrows.

Weight, about 100 lbs.



Will carry 100 brick easily, and a great favorite with the yard men. Hardwood frame, well ironed and braced. Stock size wheel, 20 inches diameter. Wheels 18 inches diameter to order. Iron wheels with steel roller bearings. We manufacture a six-spoke cast-iron wheel in one piece, 18 inches diameter, 2 inches tread, and mounted on 1¼-inch square wrought-iron axle. This is designed for hard use.

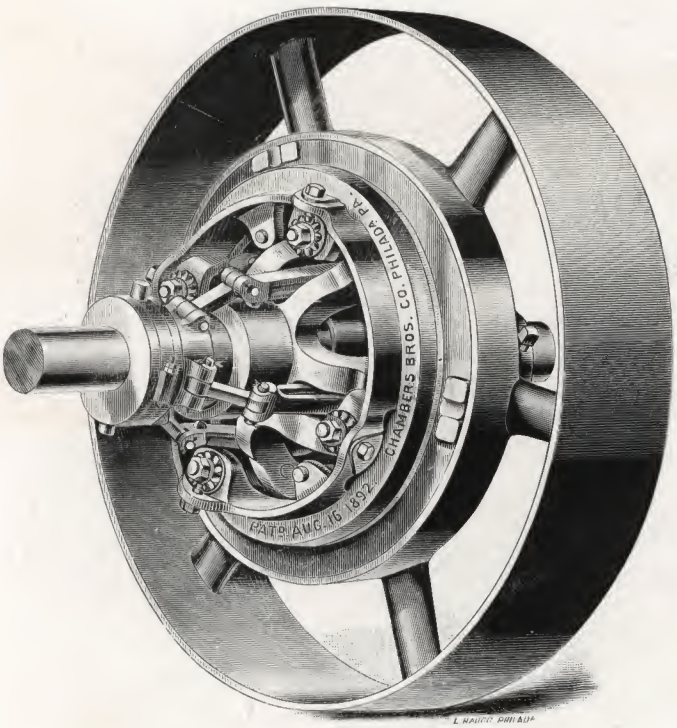
Single-Deck Spring Truck.



Weight, 107 pounds.

This truck is made with single handle, as shown, or with double handles, like a wheelbarrow.

When bricks are placed on flat pallets, at the machine, to be dried in racks, as described, page *22a,* either single or double handle trucks of this description are very desirable to transfer the loaded pallets from machine to racks.



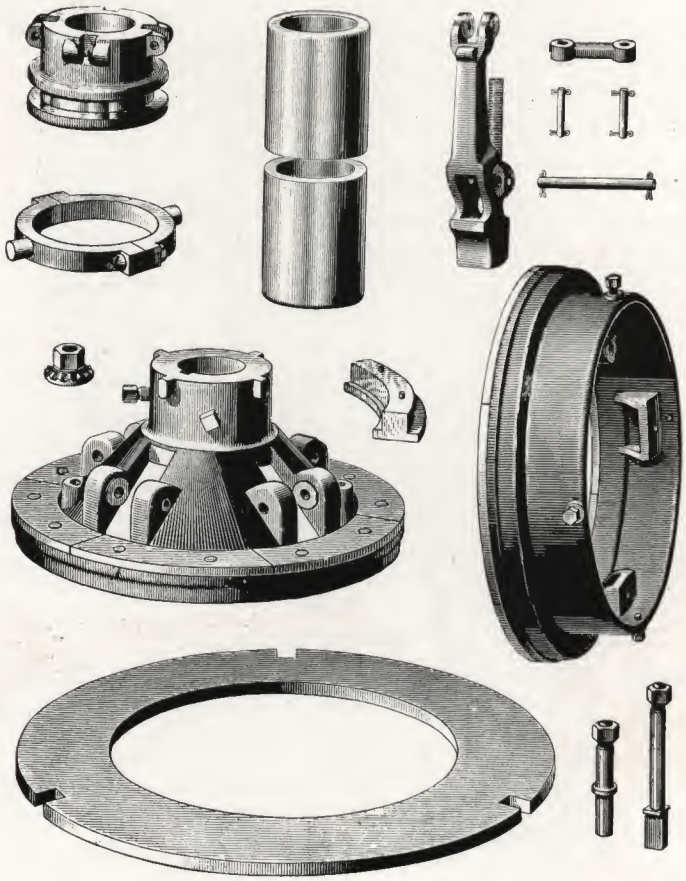
Friction-Clutch Pulleys used on our Machinery.

We have for many years used this clutch upon our Brick Making Machinery, having taken up its manufacture as one designed upon correct principles and free from objectionable features. The different parts have been enlarged and strengthened, as found desirable by continued use under severe conditions, and patterns made for much larger and heavier clutches than originally offered.

Our Friction Clutch is manufactured under a system securing interchangeability of all parts, and duplicates may be ordered by giving the number cast upon them.

The special features embodied in this clutch for which we ask consideration are:

1. A metal friction disc flexibly connected to the pulley against both sides of which the clutch members grip. Therefore, if the pulley wears out of true on the shaft, the operation of the clutch is not affected, no undue strains are brought on its parts and no adjustments required to compensate for such wear.



PARTS OF CLUTCH

2. The friction surfaces are wood to iron, a combination offering superior frictional resistance.

3. There are only two clutch members, one keyed rigidly to the shaft to which the levers are attached, and the other movable. These members

being in the form of flat-faced rings, the adjustment of the clutch is very simple and the entire frictional contact insured without resorting to a number of independent adjustments.

4. No springs are employed and the levers are so balanced that at any speed at which the clutch is run the centrifugal force has no tendency to throw the clutch in or out of operation.

5. It is compact, occupies small space upon the shaft, possesses a large gripping surface for its diameter, and so constructed that its weight is close to the shaft.

6. Our pulleys are fitted with renewable bushings, so that if from long-continued use or from insufficient lubrication the bore becomes worn, these bushings may be renewed and the pulley bore restored to its original size.

We are prepared to furnish promptly from existing patterns pulleys of 20, 24, 30, 36, 40, 44, 48, 54, 60, 66 and 72 inches diameter. We carry in stock clutches of sizes numbered 4, 5, 6, 7, 7A, 10 and 15.

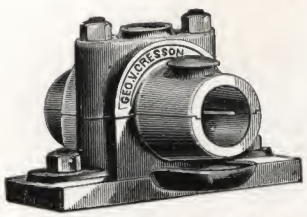
Orders or inquiries should specify diameter of pulley, width of belt, diameter of shaft, number of revolutions per minute.

From this we can select the size clutch to meet the requirements and insure the use of a clutch of ample capacity to transmit the required horse-power. Thus, a 48-inch diameter of pulley may be fitted with a number 7, 7A or 10 clutch, according to the operating conditions.

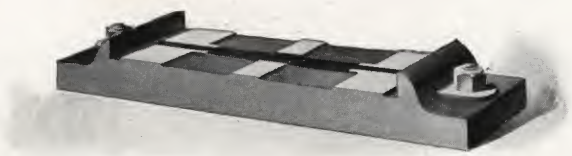
Net prices quoted upon application, giving these particulars.

Shafting, Pulleys and Journal Bearings.

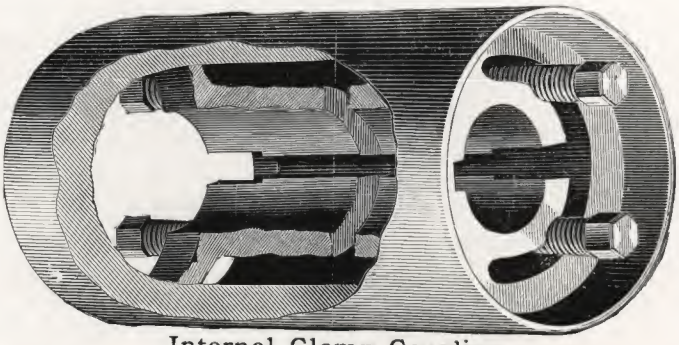
We are prepared to furnish shafting, pulleys and appurtenances for the transmission of power with complete outfits of driving belts suitable for our machinery.



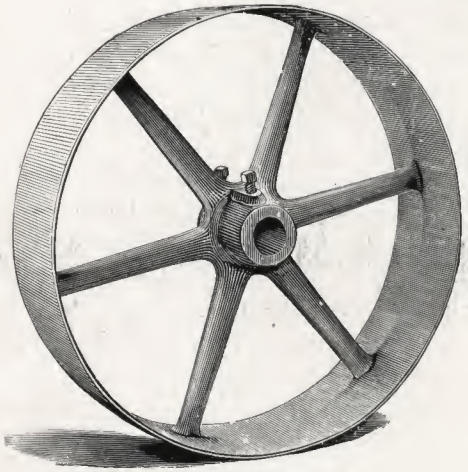
Ball-and-Socket Pillow Block Bearing. Plain, or Babbited and Ring Oiling.



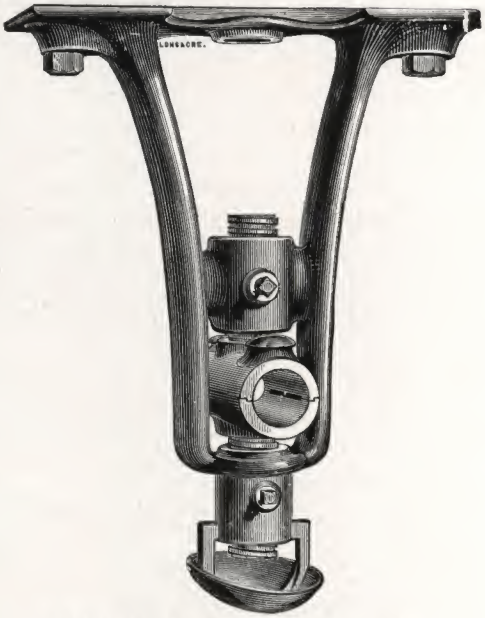
Sole-Plate for use with Pillow-Block Bearings, when mounted on Masonry.



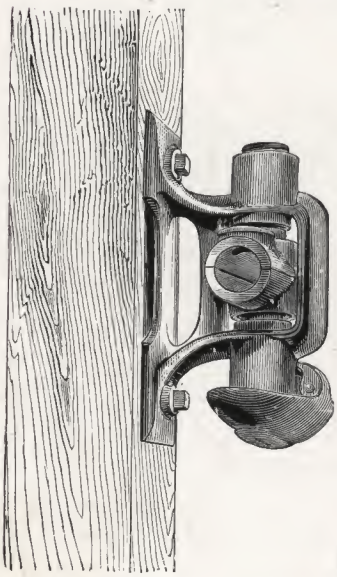
Internal Clamp Coupling.



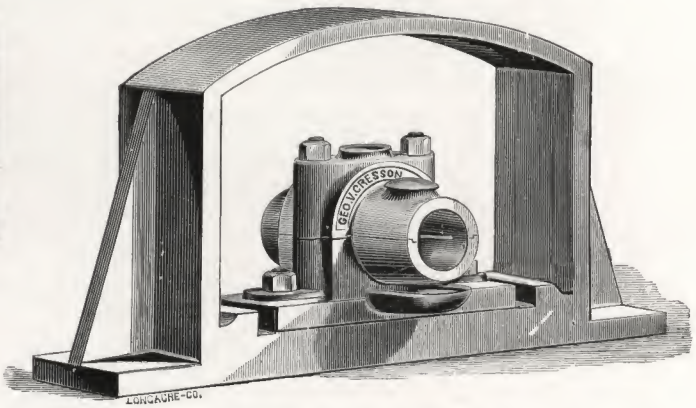
Balanced Iron Pulley.



Adjustable Drop Hanger for Overhead Line Shaft.



Adjustable Post Hanger.



Wall Box with Pillow-Block Bearing.

Drying Chambers Machine-Made Brick.

Various methods of drying may be successfully employed under suitable conditions, but no one plan can be broadly designated as "the best," nor even followed in all cases simply because of its success in certain instances. Owing to the widely different action of various brick-making materials, probably no part of the manufacturing process requires greater care, not only in selecting the method and apparatus for drying, but in its subsequent operation.

Open-Shed Drying.

The Chambers machine-made brick being molded stiff enough to permit piling on edge seven or more courses high direct from the machine, they may be loaded on barrows and wheeled to drying sheds (see page 24), there to be dried under cover but exposed to the open air. These sheds are usually about 30 feet wide by 150 feet long, with double-pitched roof, every alternate board of which is loosely secured so that it can be turned over upon the adjacent one, and thus admit sun and air. Proper construction of this roof (for which we have working drawings) permits of quick and satisfactory closing of shed roof when needed.

From three to fifteen days are required in this climate to dry bricks, according to the nature of the clay, construction and location of sheds.

This method requires the least amount of invested capital, generally secures the advantages in quality incident to slow drying, but is dependent upon weather conditions as to time required and consequent product from a given number of sheds.

Rack and Pallet System.

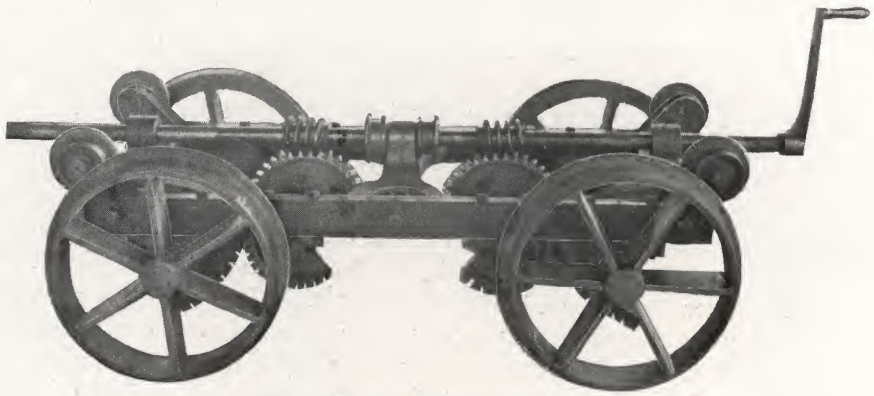
Brickmakers having yards equipped with what is termed the "Rack and Pallet System" may use the same to advantage for drying our machine bricks by placing bricks on edge on these pallets (usually 8 bricks to each pallet), transferring them by either spring trucks or barrows to the racks, and then placing the loaded pallet in its position in the rack. Our "Pallet Carrier," shown page 26a, is a most valuable appliance in connection with this system, saving labor and confusion. As the bricks are handled but once until ready to be set in the kiln for burning, and as each brick stands on edge with no weight upon it, these facts, together with the slow drying of the open-air system, result in a quality of brick that we have seldom seen equalled.

The Lift Car System for Open-Air Drying.

This system has many advantages over the use of barrows. It not only saves labor but requires less handling of the brick and offers better drying conditions for the lower courses. The brick need not be handled after being hacked at the machine until they are delivered to the kiln-setters. This contributes to better quality as well as decreased cost.

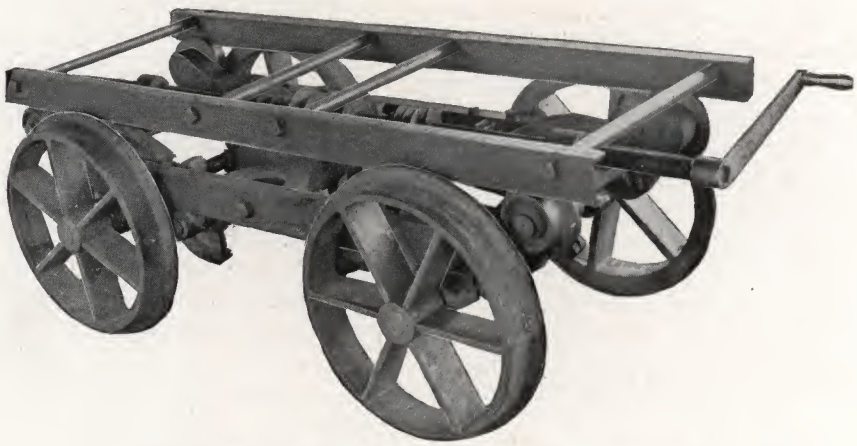
Two or more special hacking platforms are provided at the machine delivery belt upon which the loading pallets are placed. The bricks are hacked

immediately upon these pallets, about 126 brick to each pallet, two of which constitute a car-load of 252 bricks. The lift car being pushed into position, the loaded pallets are quickly raised upon the car body and taken to the sheds where the operation is reversed, the load left upon the raised rails in the sheds, and car removed.



The Ideal Brick Lift Car.

The crank may be applied to either end and one man easily operates the loaded car. In this illustration the steel lifting frame is removed to more clearly show the powerful worm wheels and lifting mechanism.



Ideal Car with Lifting Frame in Position.

The rolling contact between the channel frame and the four wheels on lifting levers reduce friction and greatly reduce the labor of operation. Power being applied at four corners, the load is lifted level and without jar.

Although not shown, the lifting frame is provided with sheet-metal top protecting the mechanism from falling dirt. The wheels are secured to axles by taper pins and journal-boxes fitted with roller bearings. Crank shaft 71 inches, pallet length 66 inches, width 30 inches. Gauge of track 24 inches. Height of lifting frame when at lowest point 19 inches, when elevated to highest point 23 inches.

SYSTEM OF DRYING SHEDS WITH CANVAS COVERS FOR ENDS AND FOR OUTER EDGES, AS USED WITH

The Ideal Brick Lift Car and Transfer Car

reduces to a minimum the labor required and the handling of the brick in connection with the open-shed system of drying.

Direct-Heat Tunnel Dryer with Metal Cars and Pallets.

This method probably utilizes to the best advantage the fuel burned exclusively for drying.

Each brick stands alone, permitting escape of moisture from all sides of it.

This dryer consists of six or more brick flues, about 40 feet long, 3½ feet wide, and 4 feet high, built of brick, with a railroad track through each, slightly descending from the machine, with fire-grates and doors at lower end, and stack at the upper end.

Each flue has an iron door, sliding in iron grooves and counterpoised by a weight at either end, so that the flue is readily opened and closed for the admission and exit of the cars loaded with the green or dried bricks.

From the grates, upon which coal, coke, or wood is burned, the results of combustion are conveyed along in a flue under the bottom of the track to near the stack end, and are allowed to escape therefrom gradually, through perforations or slots, up, under, through, and between the bricks on the iron cars.

For each tunnel there are two chambers for the admission of air, one on either side of the grate compartment, which enter the conveying flue just back of the grate surface.

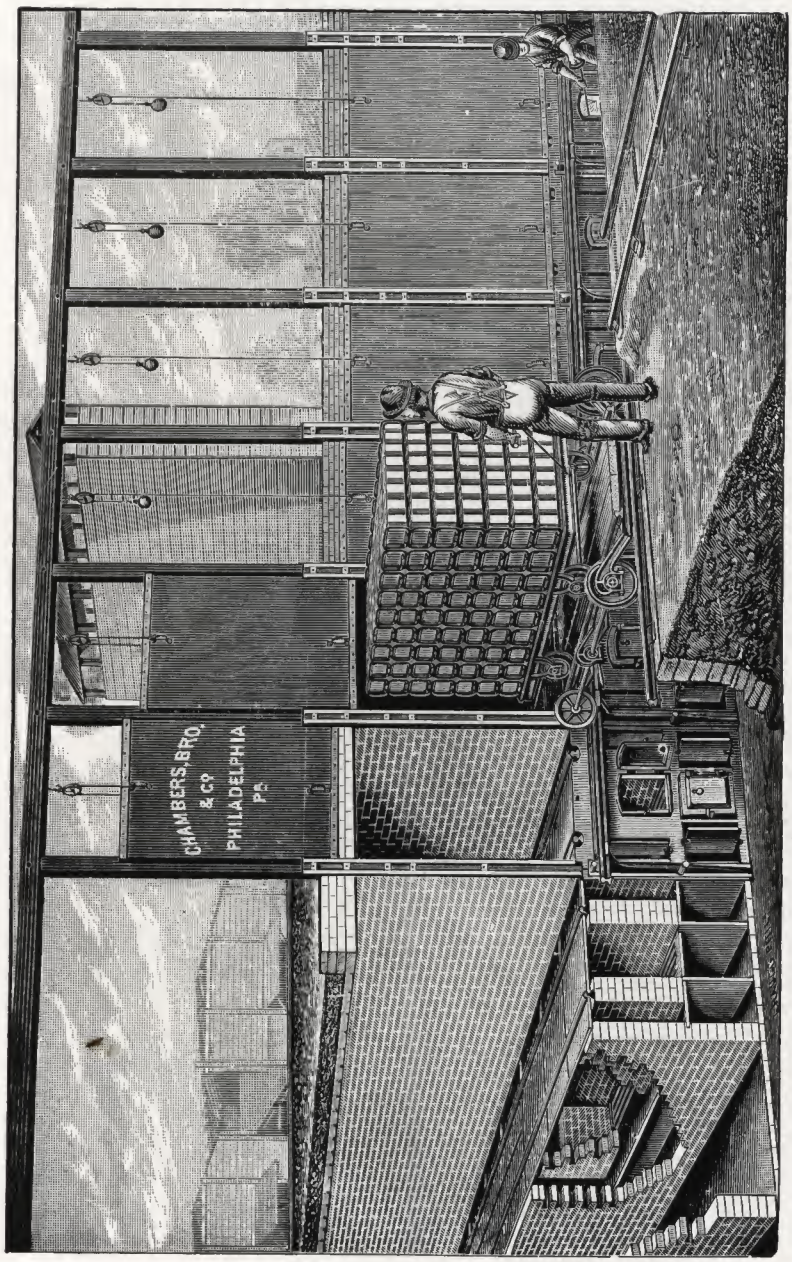
In addition to the gases from combustion, a large amount of air is admitted over and at the sides of the furnace into the flue, which becomes heated, and when distributed through the bricks by the adjustable flue, takes up the moisture from the bricks and carries it off through the stack.

The proportion of air to the results of combustion is regulated by swinging dampers, while the draft of the fire is under independent control by the ash-pit doors. (See illustration, page 115.)

Radiating Furnace Tunnel Dryer.

Our Radiating Furnace Tunnel Dryer may be constructed with either one or two tracks to the tunnel as preferred. When operated under proper conditions it is giving very satisfactory results and as the air entering the tunnels proper is heated by radiation only, there being separate flues for the products of combustion, the bricks are free from deposits of soot and from any ill effects resulting from noxious gases.

The Dryer Cars remain in good condition much longer than when exposed to gases of combustion.



Chambers Brothers Company's Improved Direct-Heat Tunnel Dryer.

Operation of the Dryer.

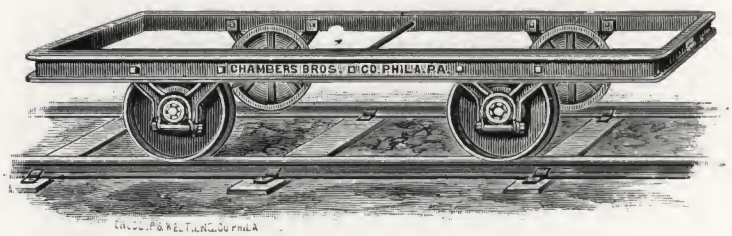
The Chambers Machine brick may be moulded stiff enough to bear hacking 7 or 8 courses high on single-deck iron cars of the pattern shown as No. 9, page 122, or double-deck cars such as No. 15, page 124, may be used. Undoubtedly the best quality of brick will be obtained by using metal pallets and loading as shown by car No. 1. In this case the brick machine must have the automatic edger and the pallet carrier described on page *26a*.

Each car, with its load of sixty-three pallets, is brought to the side of the brick machine. One man transfers the empty pallets from the car to the "pallet carrier," which carries them along parallel with the off-bearing belt and close to it, at a convenient speed, to enable the "off-bearers" to hack the bricks upon the pallets.

The motion of the pallet carrier is continuous, and when a pallet has received its quota of eight bricks it reaches a point opposite an empty drying car. Here one or more men, as the capacity of the machine may require, lift the loaded pallets from the carrier to the car. When the car is full, it is ready to be drawn to the dryer, and another that has just been emptied takes its place.

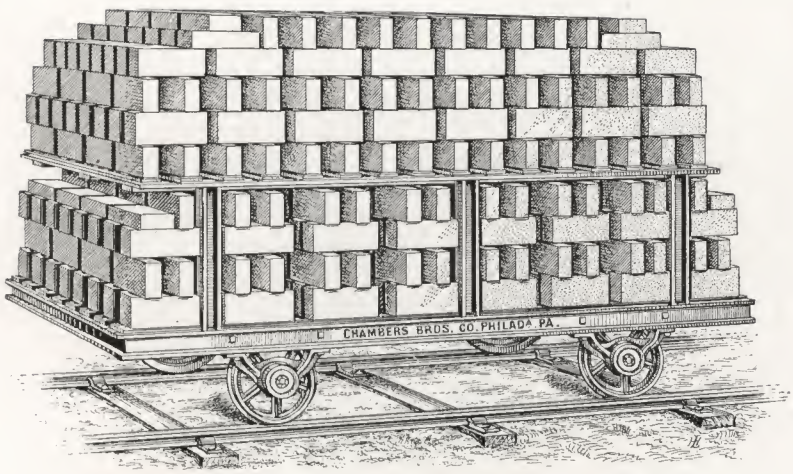
The loaded car is then run on to the transfer-car and from thence to any one of the flues, where a current of heated air (an *artificial* summer breeze) is forced through them, the steam from the bricks near the fire condensing on the surfaces of the cold ones and preventing checking or cracking, while the bricks absorb the heat from the steam and *commence drying from the inside first.*

When the bricks directly over the fire are dry, the car is run out to the kilns to be set, a fresh car being put in at the upper end, pushing the others down and bringing another partially dry car immediately over the fire, and so on.



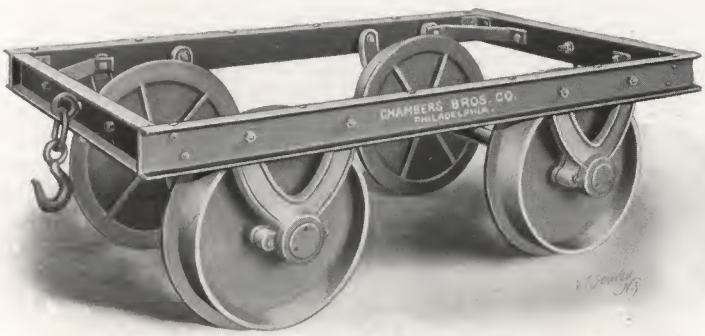
Chambers's Wrought Body Dryer Car, No. 1, for Use with Pallets.

The large investment required to equip a drying outfit with steel pallets and their perishable nature has been the principal bar to a larger use of this method.



Steel Channel-Frame Double-Deck Brick Car.

We make over twenty different patterns of cars for handling all classes of plastic materials.



Car No. 18.

A good strong general-purpose car, having 4-inch steel channel body, well braced and riveted. Axles 2 inches diameter, with steel roller bearings. Broad-tread flanged wheels 18 inches diameter may be used on wooden or on iron rails. Weight 700 pounds.

Cost of Artificial Drying.

One ton of anthracite coal will dry twenty-five thousand Chambers's Machine-made bricks.

In comparison with the practice of wheeling brick on barrows from machine in drying sheds, hacking them in the sheds, reloading on to barrows and wheeling to kilns, the cost of the coal to dry brick artificially is more than offset by the decreased labor, while the amount of fuel to burn the bricks is less, because the bricks are more thoroughly dried than by the open air.

Drying Brick by Heat from a Burning or Cooling Kiln.

Brick manufacturers using what are known as Down-Draft Kilns may use the heat from one or more of these kilns to dry their bricks in properly constructed drying tunnels.

A system of underground flues with dampers and a positive driven exhaust fan is required. The advocates of this system claim that it is the cheapest method yet devised for drying common building and street-paving brick.

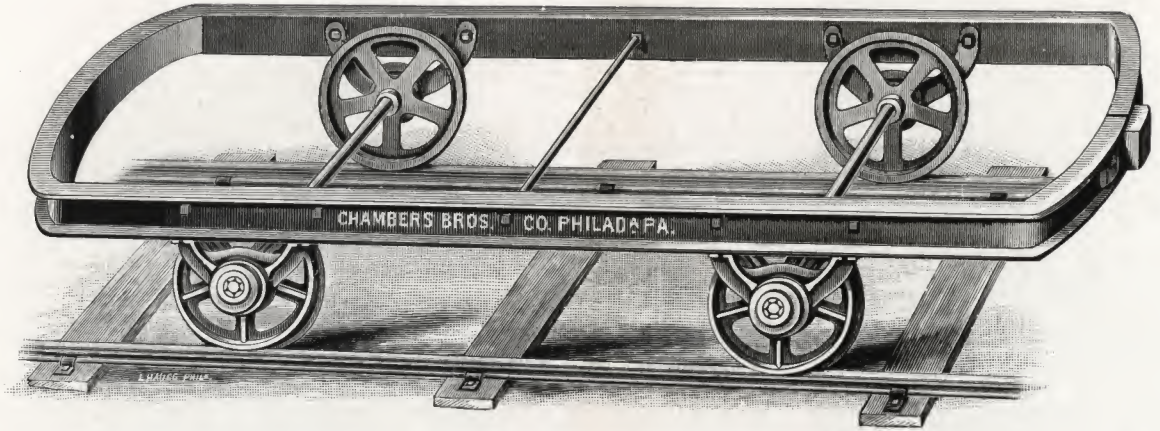
We can furnish plans showing the construction of works employing this system successfully. Prices quoted upon application.

Direct Heat Stoker-Furnace and Blower Dryer.

A very low grade fuel may be used for drying common brick by the aid of a Stoker-Fed Furnace discharging its gases into a large chamber constructed of brick, from which a blower takes its supply of heated air and sends it into the brick-constructed Drying Tunnels. The temperature of the furnace gases is reduced by the admission of the necessary volume of air into the chamber supplying the Blower. Through the adjustment of the Stoker-Feed, the regulation of fresh air supply and speed of Blower, the whole apparatus is capable of control and adaptation to different conditions.

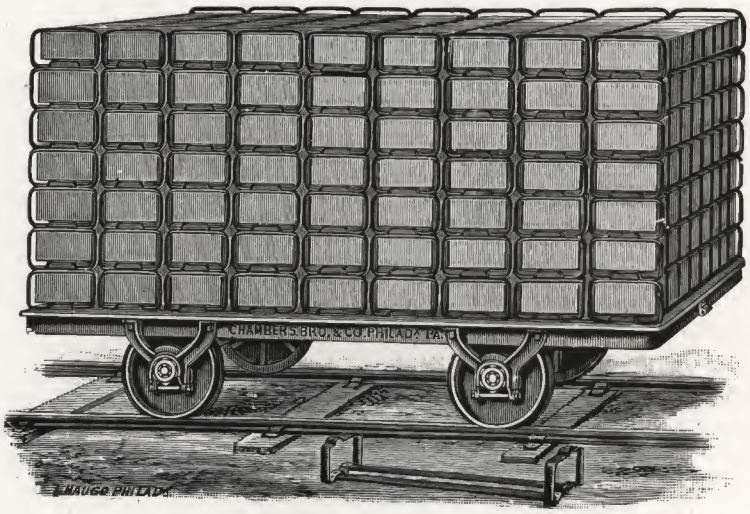
The rapid deterioration of dryer cars and other metal equipment must be figured in giving consideration to this plan.

The Chambers Wrought-Iron or Steel Channel-Frame Car is without an equal.

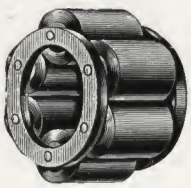


ENLARGED VIEW OF NO. 1 CAR.

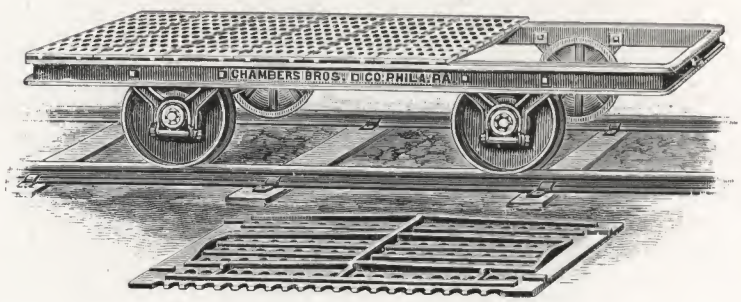
We have devoted a great deal of attention to the design and manufacture of cars for transporting green and dried bricks about the works during process of manufacture, and have many different patterns. The channel-frame pattern shown above we believe to be the most durable brick-dryer car made. They are well proportioned and made only of good materials. An anti-friction roller-journal bearing is used on these cars.



Dryer-Car with 63 Pallets, carrying 504 Bricks.

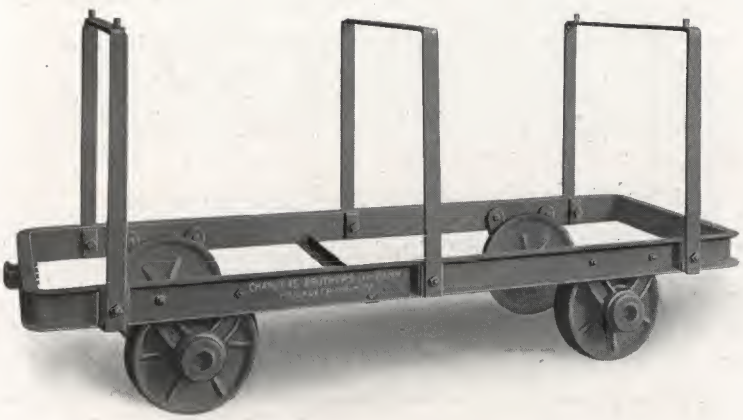


The cage-roller bearing employed on our cars is made up of six iron rollers connected by means of two malleable-iron rings.



Chambers's Wrought-Body Dryer-Car, No. 2.

This is precisely the same as car No. 1, but supplied with a cast-iron perforated top, so that the bricks may be hacked directly on the car without the use of pallets. The top is made of nine pieces or slats of good design, all heavily ribbed on the under side to give strength and to permit of the greatest possible air-spaces.



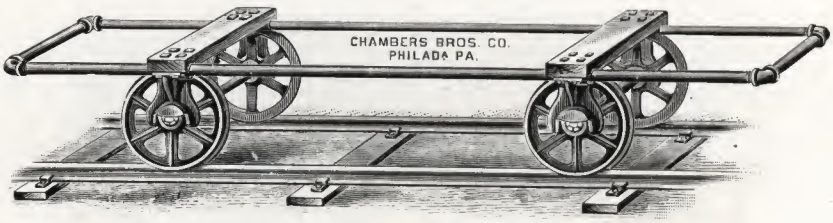
Wrought Channel Body Car, No. 3.

Has 4-inch channel body. Fourteen inch diameter wheels on 1½ inch axles. Full cage roller bearings. Three pairs of wrought posts. Unboxed weight without decks, about 520 pounds. Body 92 inches long by 31 inches wide.

Single Deck Car, No. 3 B.

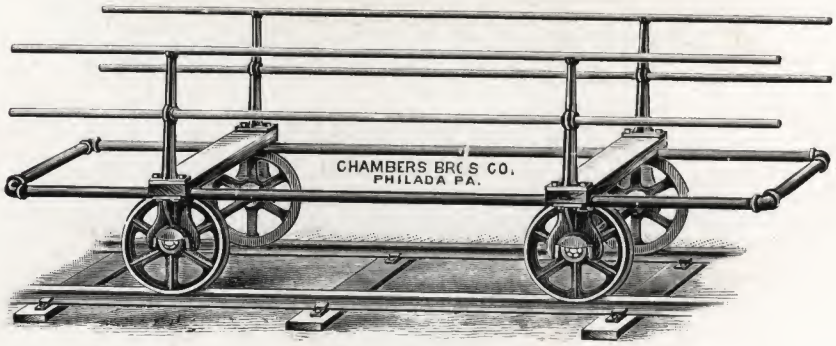
Body of 3 x 4 inch steel angles. Length 92 inches, outside width 34 inches when built for 22½ gauge of track. Length, width, and gauge can be made to suit customers' requirements. End and middle cross rails of rolled steel forged to shape. Fourteen inch diameter wheels on 1½ inch axles. Full cage roller bearings.

Unboxed weight without deck, about 400 pounds.



Chambers's Pipe-Body Dryer-Car, No. 4.

For transporting "terra-cotta lumber" and other clay products of greater bulk in proportion to its weight than building brick.



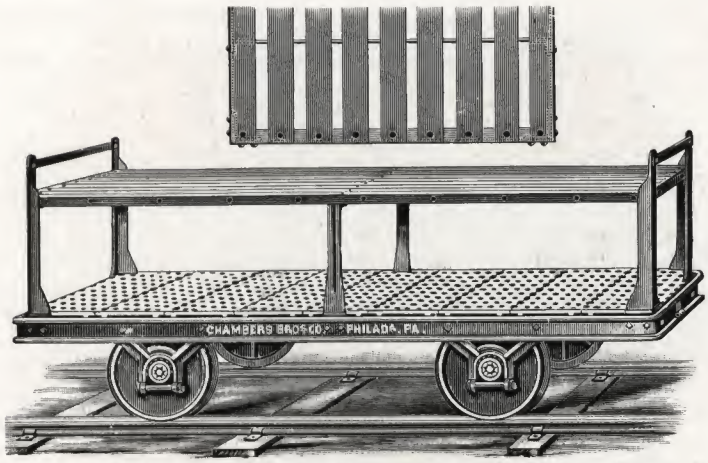
Chambers's Pipe-Body Dryer-Car, No. 5.

This car is the same as No. 4, with the addition of cast-iron corner-posts or standards and pipe-rails, permitting of the addition of two additional decks or platforms. It is capable of carrying a very large number of small pieces of clay wares.

Chambers's Platform Car, No. 9.

A perforated iron-top car with cast-iron frame. It is provided with nine perforated 31-inch slats, thus making a platform 31 inches wide by 92 inches long.

Dryer-cars of this pattern without the perforated top are supplied, of various lengths and widths, for use in connection with either wooden or metal pallets in drying soft mud bricks.



Chambers's Double-Deck Car, No. 11.

is our No. 2 wrought-body dryer-car, supplied with cast-iron corner and middle posts, and an upper deck of 2-inch flat iron riveted to a well-braced angle-iron frame. A very strong, substantial, double-deck car. The upper deck is removable. (See also Car No. 15.)

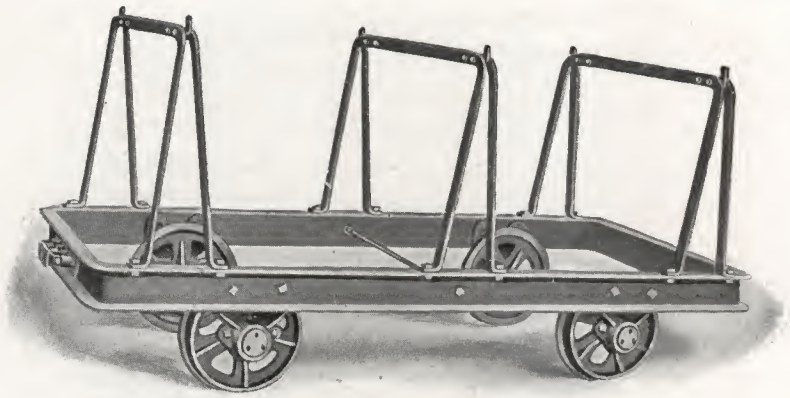
Double Deck Car, No. 12.

Lower deck of cast-iron pallets, each of size to fully cover the edge surface of a paving block. Upper deck of 4-inch steel slats riveted to three steel angles. Designed for a manufacturer of street pavers.

Chambers's Pallet Car, No. 13.

This is a good, strong, cast-iron car, 40 inches in width by 70 inches in length.

It is used in connection with pallets when it is desired to place the pallets lengthwise on the cars.

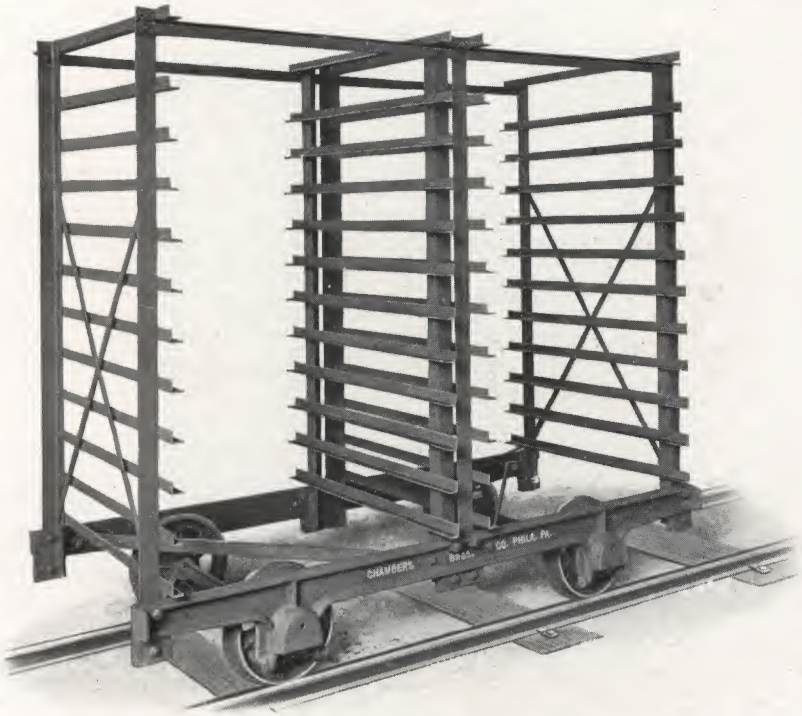


Steel Channel-Frame Car, No. 17.

Provided with three pairs of posts for support of upper deck, and designed for use with wooden or metal decks.

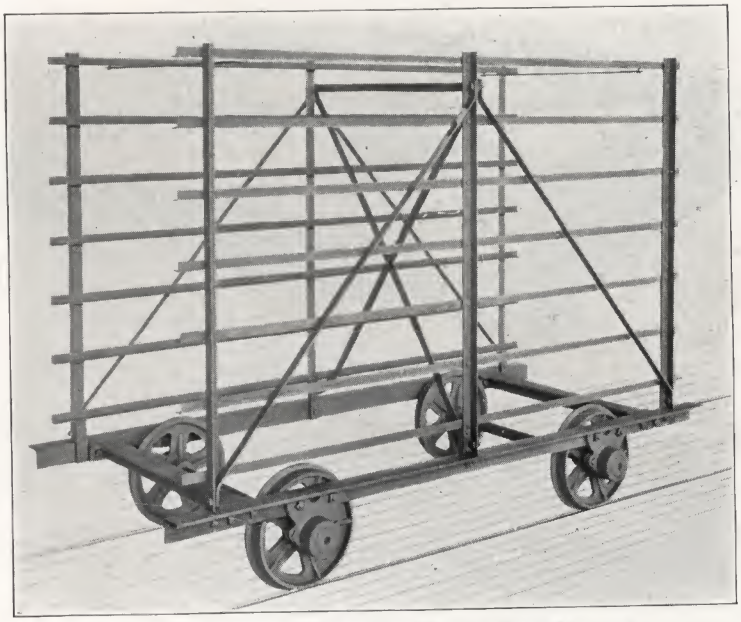
The Chambers Wrought Channel-Frame Double-Deck Car, No. 15.

This is a car in which the frame is made of one piece of 4-inch channel bent to shape, the ends being secured by a heavy clip. The axles are 1½ inches diameter and journalled with our improved cage-roller bearing. The lower deck is made of cast-iron plates. The posts and cross-rails supporting upper deck are entirely of wrought iron. The upper deck is made of one piece of perforated steel plate supported by I beams riveted to its under side. This makes a very stiff deck upon which brick or other clay ware of any dimensions can be placed in any desired position.



Chambers's Angle-Iron Rack Car, No. 14.

A very stiff, rigid rack car for metal or wooden pallets without legs, with rack made of angle-iron cross-braced at each end. Similar car is also made with angle side frames of steel.

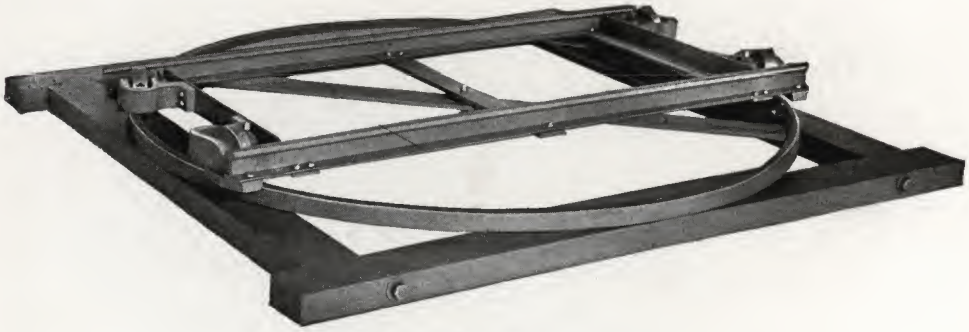


The Chambers Wrought Rack Car, No. 16.

Has 12-inch diameter wheels, 1½-inch axles with steel roller bearings. Side frames and racks made of rolled angles riveted, and thoroughly well braced. The pallets or boards are loaded from either end of the car. Adapted to clay wares of various sizes and shapes.

Rack Car, No. 20.

We make various patterns of steel rack cars mounted on roller-bearing casters. Length, width, height, and number of racks, or space between racks desired, should accompany enquiries for price.



Iron Portable Turn-Table.

This table is made so that it can be easily lifted apart, thus enabling two men to readily move it from one kiln to another.

It is constructed principally of wrought-iron or steel, the different parts being securely riveted, and the whole designed to stand the rough handling of brickyard use.

The upper section turns upon a wrought-iron ring, the four rollers being turned upon the face and located close under the load to be carried. It is a very easy-working turn-table, and is guaranteed satisfactory.

An extra heavy table with an iron base and ring is made to order.

Rack Car No. 21.

Cars designed for special purposes to order.

MONTAGUE & COMPANY,

Sewer and Culvert Pipe, Fire Brick and Milled Clay, Flue Linings and Flue Pipe.

CHATTANOOGA, TENN.

CHAMBERS BROTHERS COMPANY, 52nd St. and Lancaster Ave., Philadelphia:

Gentlemen:—Your letter enclosing bill of lading for car of brick machinery duly received. We have the machine in position and running. There is some satisfaction in assembling machinery that goes together as well as this did. We are very much pleased with the appearance of it and hope that it will give us the required amount of clay. . . .

Thanking you for assisting us by turning the machine out promptly.

Yours very truly,

MONTAGUE & CO.,
By (signed) LAWSON.

HILLSIDE BRICK AND BLOCK
SIDEWALK BRICK
CROSSING BRICK
FOUNDATION BRICK
SEWER BRICK
BUILDING BRICK
CRUSHED BRICK

CAPITAL PAVING BRICK AND BLOCK
AND
IMPERVIOUS FACE BRICK
MANUFACTURED BY

The Barber Asphalt Paving Company

ADDRESS ALL MAIL TO
P. O. BOX 565

Des Moines, Iowa Oct. 27th, 1909.

Chambers Bros. Co.

Philadelphia, Pa.

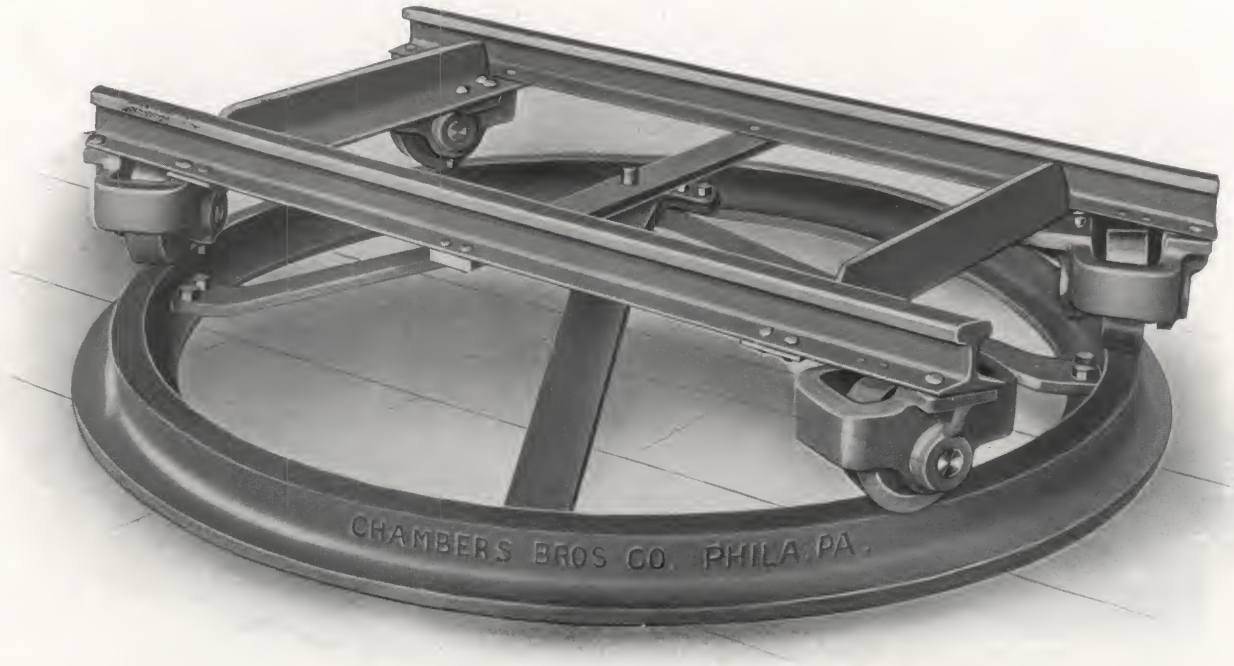
Dear Sirs:

We made 57,600 block on your machine the first day it was in operation. We are making block this morning at the rate of 9600 per hour, this being the second day of operation.

Very truly yours,

THE BARBER ASPHALT PAVING COMPANY

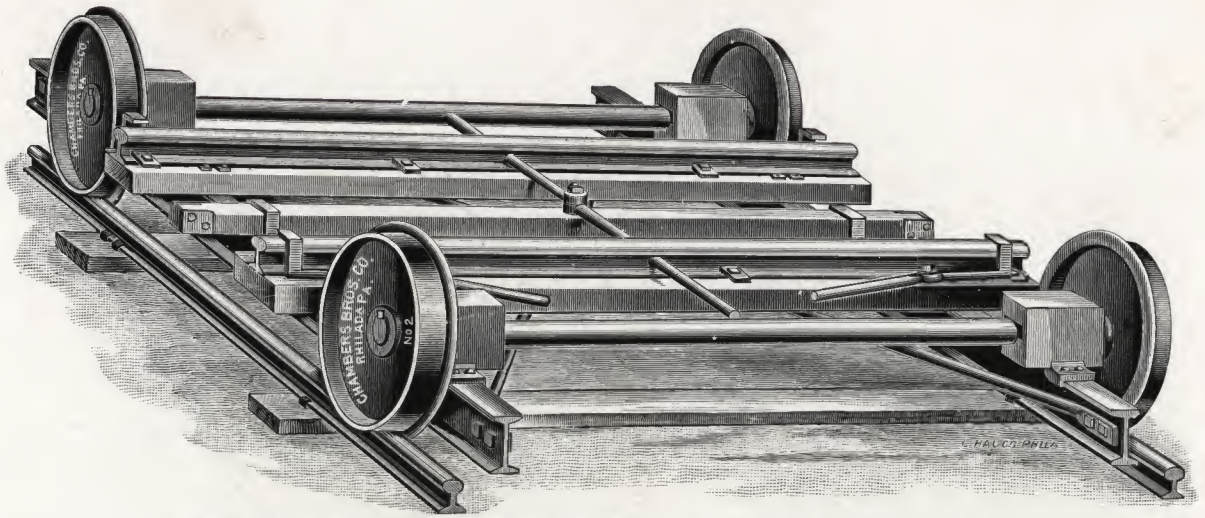
Manager.



Heavy Pattern Iron Turn Table, No. 2.

This table has a heavy iron base ring with wrought cross braces in which is mounted the centre pin. Rollers are turned to proper radius to suit diameter of ring. Heavy steel angles with 25 pound T rail riveted together are used. Ring diameter is 4 feet 8 inches, with 5-inch width of base. Rollers 6 inches diameter by 2 inches face. Rail 4 feet 7 inches long. Unboxed weight, about 700 pounds.

Similar turn table of larger dimensions, Drawing No. 49-B-86. Weight about 900 pounds.



Chambers Brothers Company's Wrought I Beam Transfer Car.

Unboxed weight about 760 pounds.

Transfer-cars in dryer equipment have received our especial attention, and while we are prepared to make several different patterns, we show in this illustration one that embodies the best features. The body, instead of being of cast-iron, is made of two pieces of wrought I beam, with diagonal forged braces. The axles are unusually heavy and are journalled in a closed box, the lower part of which is packed with a greased packing, which secures constant lubrication. The wheels, being keyed on to the axles, can easily be renewed when necessary. The fittings of the car generally are forged and adapted to withstand hard usage.

This style of car is preferably made with the frame and journal boxes upon the outside of wheels unless close conditions require the location shown in illustration.

Double Transfer Car.

Designed to carry one loaded and one empty brick car.

We also make a Double Transfer-Car of this same general design, fitted with Standard Steel Roller Bearings.

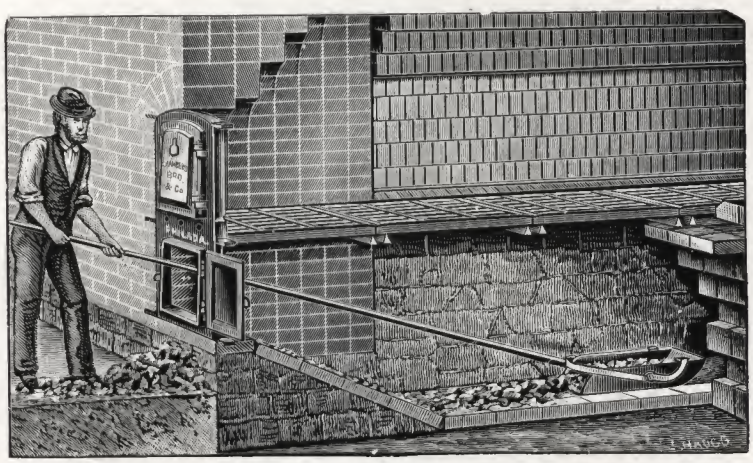
The frame is of 5-inch heavy section steel beam. Fourteen-inch diameter heavy plate pattern chilled wheels are used. Height from rail to rail cannot be less than 6½ inches. When built to run on gauge of 3 feet 8 inches, drawing No. 81-C-39. Unboxed weight is about 850 pounds.

Burning Bricks.

The cost of burning bricks made by our machines, and dried in the sheds in the usual way, is, so far as we have been able to ascertain, about the same as that of other bricks, and varies so much with the nature of the clay, the kind of fuel used, and the kinds of kilns or clamps, that we cannot give data by which the cost of burning could be ascertained to a certainty in various localities.

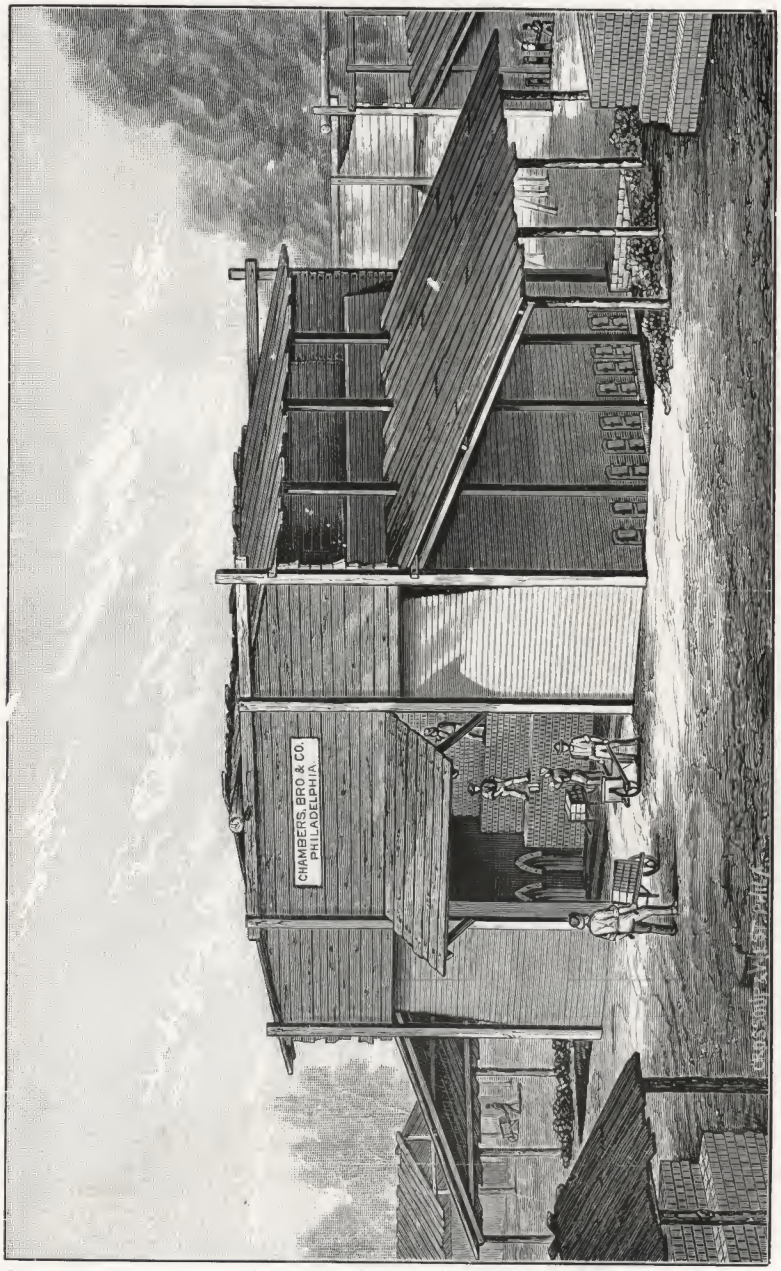
It requires about one-half a cord of wood to burn one thousand bricks, depending on the quality of wood as well as on the kind of kiln and clay. In Philadelphia, with the ordinary up-draft, open-top kilns, it requires from 350 to 700 pounds of coal to burn one thousand bricks, and from four to six days and nights to burn a kiln of 200,000 bricks averaging 5% "Salmon" grade.

Using coal in the open-top kiln, illustrated herewith, three men—one burner and two assistants—are employed. From this data, the cost of burning in any locality may be approximated, bearing in mind that these figures refer to common building brick, containing about 85.6 cubic inches of clay, unburned.



Showing Method of Removing the Ashes from Coal-Burning Kiln.

For this work, our swinging ash scoop, shown also on page 135, is a very convenient tool. The sectional view of single-kiln arch shown above represents kiln, frame, and doors in position, and the ten-bar kiln grates extending clear across the kiln. (See also page 134.)

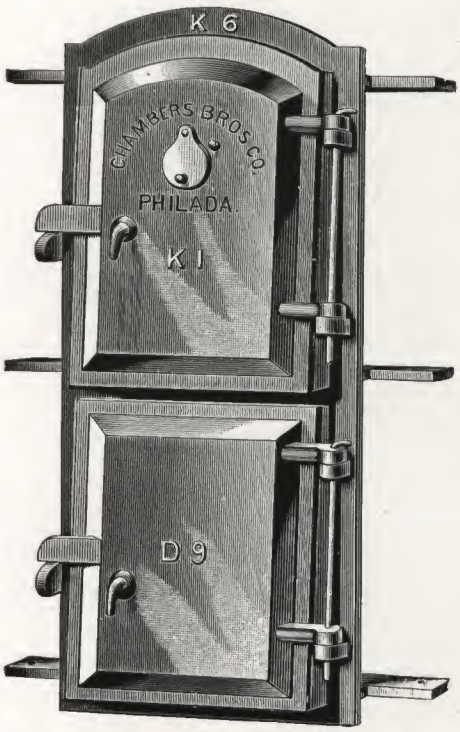


The above is a General View of a Regular Philadelphia "Ten-Eye" Coal-Burning Brick Kiln, Sometimes Called "The Dutch Kiln."

Capacity, 180,000 to 200,000 common building bricks.

Kiln Castings.

The most practical kilns, as used in Philadelphia, are all fitted with iron grates, doors, etc. Many designs have been tried both for doors and grates.



We have grates varying from nine to twelve bars, and doors and frames of various sizes and styles.

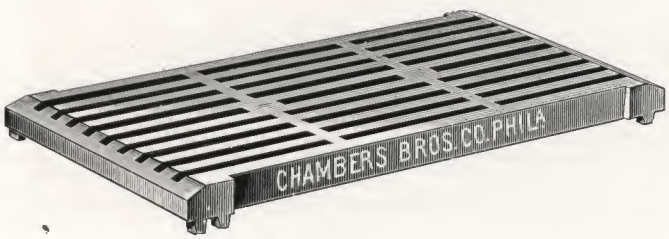
The kiln frame shown is well designed, and embodies the suggestions of a number of practical, experienced brick burners. The doors, without being unnecessarily heavy, are made to prevent warping, so far as possible, and are hung on an angle, so that their weight will keep them closed. Weight, unboxed, about 120 pounds.

Frame K 6 is 14 inches in width by 33½ inches in height, outside to top of arched head.

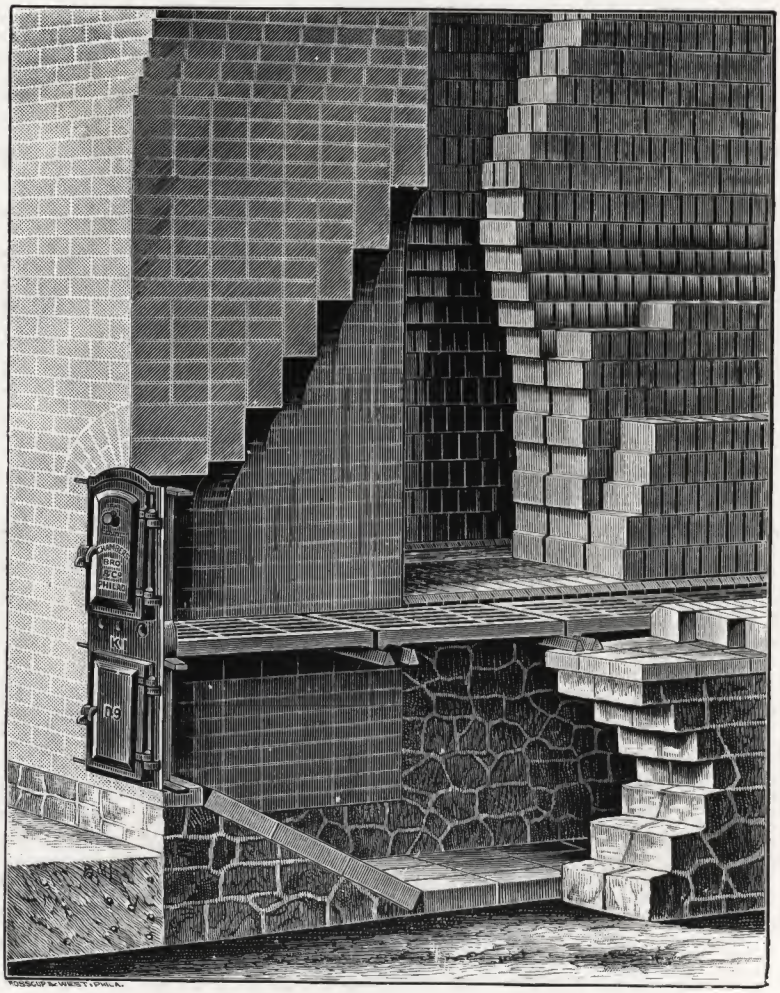
We have several patterns for kiln grates having different width of openings to suit various fuels. Weights ranging from 50 to 65 pounds per grate.

Our grates are made with bevelled ends, thus facilitating the operation of "spading" a kiln, and obviating many annoyances with the old-style square-end grates.

Estimates for kiln castings furnished upon application, and drawings of the most improved Philadelphia coal-burning kilns will be furnished to those purchasing kiln castings from us without additional cost.



Our new bevelled-end kiln grates avoid the annoyance and loss occasioned by tools catching against the end of a grate.

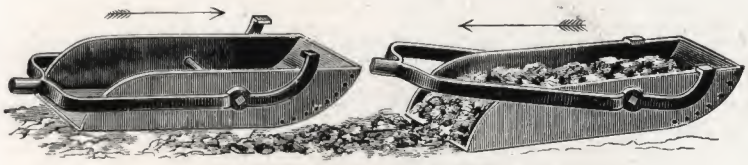


Improved Kiln Doors and Frame.

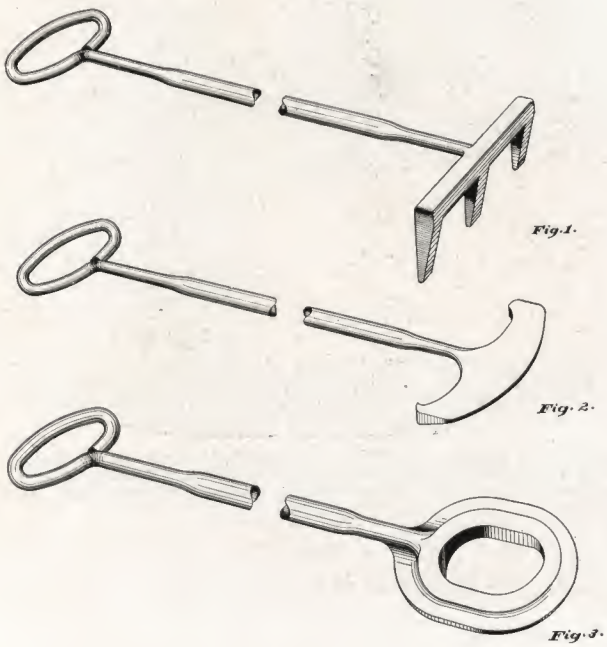
Showing also the manner of setting grates, constructing ash pit, kiln walls, forming arches, etc.

Kiln Tools.

We are prepared to furnish kiln tools of all kinds, spades, rakes, hoes, harpoons, or slash bars, and show below an improved swinging ash scoop.



When being pushed into the ash pit, the scoop rides over the ashes, and when withdrawn always brings out a full load. We also supply plain ash scoops open at both ends and ironed to receive wooden handles.

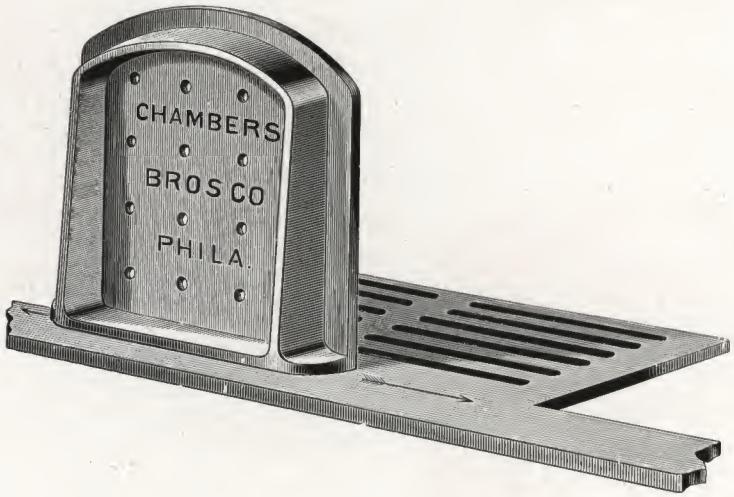


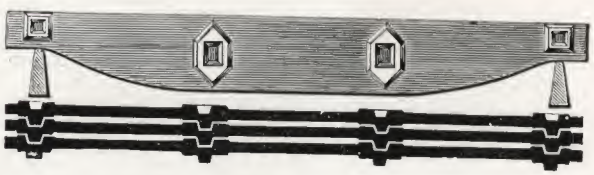
A complete set of kiln tools for "Dutch Kiln" comprises an ash scoop, as mentioned above, and the following:

1 Rake, Fig. 1, with pipe handle 18 feet long.
1 Rake, Fig. 1, with pipe handle 12 feet long.
1 Harpoon, Fig. 2, with pipe handle 18 feet long.
1 Harpoon, Fig. 2, with pipe handle 12 feet long.
1 Slash Bar, Fig. 3, with pipe handle 12 feet long.

Up-Draft Kilns with Outside Furnaces.

With many brick manufacturers the kilns having outside or box furnaces are preferred to those that burn the fuel immediately under the arch brick. While generally admitted to burn more fuel, they are credited with yielding a better quality of brick from the lower courses than can be obtained from the ordinary Dutch kiln. Door weighs about 60 pounds. Sill plate, 90 pounds.





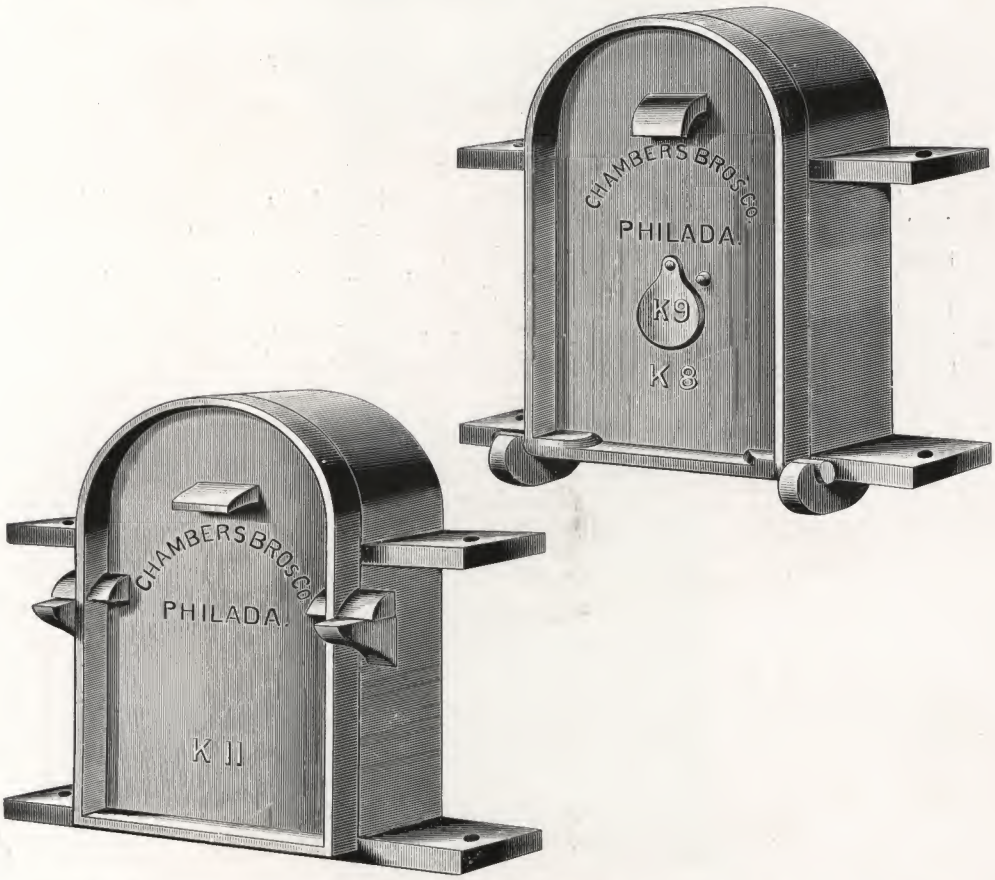
For those kilns employing outside furnaces, such as the Sharer, Morrison, Wingard, etc., we make furnace plates with sliding doors. We also supply grate bars for such kilns made from single or multiple patterns.

The interlocking Le Van bar has been largely used for both kiln and boiler works, and is well regarded.

Wood-Burning Kilns.

For kilns burning with wood we have two styles of frames,—one with door hinged at the bottom and the other door resting on lugs cast on sides of the frame. This style permits of the door being set any distance desired

from the frame, thus regulating the admission of air. In ordering from the accompanying illustrations, designate by letter and number the style wanted.



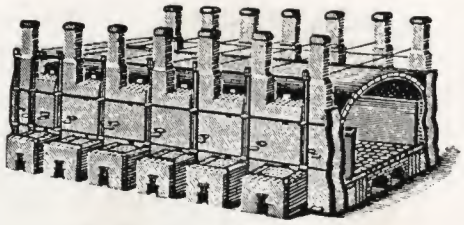
Inside measurement, 12 inches wide by 14 inches high to top of arch. Weight of frame and door, complete, about 115 pounds.

Kiln frame K 12 with Door K 13, same design as K 11; inside measurement, 14 inches wide by 16 inches high to top of arch. Weight of frame and door, complete, about 130 pounds.

Down-Draft Brick Kilns.

In the manufacture of so-called "Vitrified Brick" for paving streets and roadways the down-draft kilns are found necessary to make the business profitable. Only in kilns of this class, either round or rectangular, have we seen a sufficient percentage of pavers burned to make this business successful.

We are not interested in any kiln patents, but can put our customers in communication with owners or builders of kilns of this type that are being successfully used in the paving brick business.



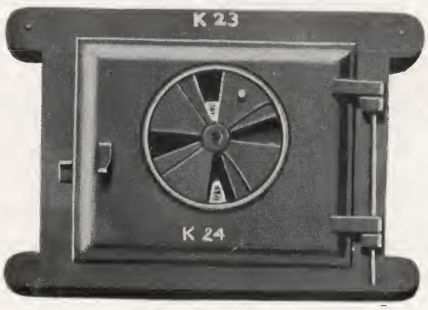
Down-Draft Brick Kiln.

The above illustrates a down-draft rectangular kiln in very successful use for burning paving bricks. We have patterns and are prepared to furnish complete sets of cast-iron work for these kilns.

In connection with this style of kiln the blower and flues mentioned, page 118, are used to take waste heat for drying purposes. The fuel used in burning paving brick in these Down-Draft Kilns is variously stated as ranging from one ton to eleven hundred pounds of coal per thousand of brick.

Fire Door and Frame without Ash-Pit Door, Pattern K 27, K 28.

Inside measurement of frame 14 inches wide by 16 inches high. Has an iron liner or fire plate secured to inside of door. Frame has a flange 3 inches deep that projects into the kiln wall. Weight of frame, door, fire-place, and wicket, complete, about 110 pounds.

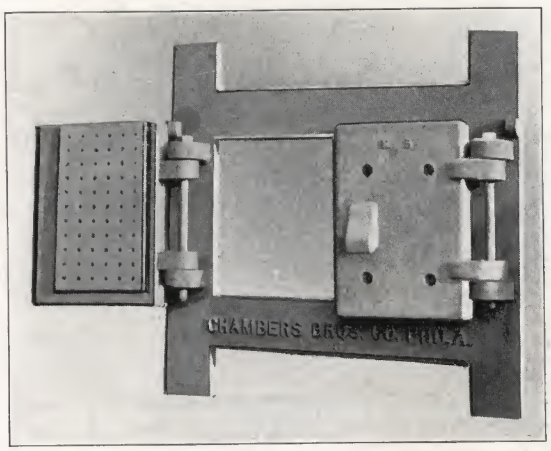


Pattern, K 23, K 24.

Fire Door and Frame.

Inside measurement of frame, 15 inches wide by 11½ inches high. Frame is flat and secured by anchor rods through the four corner lugs. Weight of frame and door with wicket, complete, about 50 pounds.

We have complete sets of patterns for cast-iron work used in the construction of muffle kilns as generally used by pottery manufacturers. The main frame shown here has opening 2 feet 9 inches wide by 7 feet 10 inches high. Weight, about 1000 pounds.



Fire Frame K 16 and Doors for Muffle Kiln K 14 and K 15.

The doors have removable cast-iron perforated fire plates, or may be fitted with fire-brick. Opening in frame is 15 inches wide by 9 inches high. Weight of frame with two doors and fire plates, about 110 pounds.

Warrantee and Advantages of Using the Chambers Machinery.

Aside from the merit of being carefully designed for the purpose, constructed of good material and workmanship under a system of interchangeable parts our machinery is offered under the privilege of acceptance after trial.

While in almost every case our machines have made an output in excess of rated capacity, we have occasionally been mistaken as to what could be done with certain materials when the precaution of a preliminary test on full-sized machine was omitted. (See "Clay Tests," 149.)

Therefore, in the absence of specific agreement to the contrary, it is our practice to ship brick machines to intending purchasers for the purpose of trial. During this trial, and until accepted and settled for by purchasers, it is regarded as our property, to be operated for the benefit and at the expense of prospective purchaser. If during this trial it should prove to be unsatisfactory, so that its purchase is not desired, it may be returned and we will make no charge for its fair and proper use during trial.

Our machinery is offered in good faith, based on the information we have at time of order, but, aside from the privilege accorded customers as cited, we assume no other liability in event of failure of a machine to meet our expectations.

Should any individual piece of machinery prove to be defective in material or workmanship to an extent affecting its usefulness, we will supply a duplicate part in exchange f. o. b. Philadelphia without charge, we reserving the option of requiring the defective part returned to our works, freight at our expense.

Our machinery receiving the materials—the different strata of clay, sand, and loam for making bricks—direct from the bank by the cart-load and converting it into bricks without any additional handling, ready to be immediately *hacked* in the drying-sheds or on the drying-cars, saves a great deal of labor in comparison with other methods and appliances, and in connection with open shed system of drying enables our customers to lengthen their brickmaking seasons from four to six weeks.

This alone is of considerable importance, and a great recommendation to our process, where bricks are wanted in the early season.

Another and greater advantage is that the manufacturing of bricks is conducted entirely under cover, the bricks at no time being exposed to the weather.

Cost of Manufacturing Bricks by the Chambers Process.

It is impossible to give a cost of manufacturing bricks that would hold good in all localities. Clays are so different, some requiring twice the labor to dig, others twice the coal to burn; then bricks vary so in size that we can only approximate it, and take Philadelphia sizes and material as a fair average.

The labor required to run one of the Chambers machines, largest size, in ordinary material (exclusive of digging the clay, hauling it to the machine, and

off-bearing the bricks) is, two men to feed the machine, one man to tend the cut-off and sanding device, and one engineer or fireman.

Three-fourths of a ton of anthracite coal, or of anthracite coal-dust, eighteen bushels of bituminous coal, or one cord of wood, with a good engine, will make from 45,000 to 50,000 bricks of Philadelphia size from good clay. From this the cost of converting the clay into green bricks can easily be computed for any locality.

The modern "brick factory," catering to a large and steady demand for a staple article, has made it quite common to operate two, four, and, in some cases, six of the largest Chambers machines at one yard and under one management. Such wholesale manufacture has so reduced operating expenses that the present cost of production under such circumstances seems almost incredible when compared with the earlier methods when operating only one machine. The experience with these large factories, however, points to the conclusion that, excepting one or two items in the expense account, the minimum cost of producing bricks is reached by operating the Chambers machines in pairs.

The use of two machines together permits of the profitable employment of all labor-saving methods and appliances yet devised in the several operations of digging or mining the clay, its conveyance to the machine house, its preparation for the brick machines, and, finally, the operation of the machines themselves under the most favorable circumstances.

Labor Employed in Operating two Chambers "B-C D," or No. 7, Machines, using Steam Shovel to Dig the Clay.

1	Steam-shovel engineer	$
1	Crane man or boy on shovel	
1	Boy and mule to switch cars in pit	
2	Men in pit to clean tracks and in general attendance	
1	Man at friction-hoisting drum	
2	Men in machine-house to dump cars and attend clay granulator	
1	Man attending pug-mills, regulating water supply, etc.; the pug-mills discharging automatically into feed-hopper of each brick machine	
2	Men, brick-machine tenders	
1	Man to supply sand-boxes with sand	
8	Boys to off-bear bricks (4 to each machine)	
1	Steam engineer	
	Total	

Labor Employed in Operating one Chambers "B-C D," or No. 7, Machine, —Digging Clay by Hand, and using Horses and Cars to Haul Clay,— Bricks being Hacked under Sheds for Open-Air Drying.

5 Bankmen	$
3 Horses	
2 Drivers (boys)	
2 Men feeding hopper	
1 Engineer, who does his own firing	
1 Machine Tender	
4 Boys off-bearing	
4 Wheelers	
4 Hackers	
Total	

Where machines are operated in this way with good clay, this force of men places 60,000 bricks per day under sheds ready for drying.

In comparing the output of machines in different localities, the relative size of bricks made, and quality of clay used, must be considered.

The labor usually employed in operating one "C-C D," or No. 4, machine, exclusive of digging and hauling clay, is:

1 Man to feed	$
1 Engineer, who is also machine tender	
3 Boys to off-bear bricks, one of whom also sieves sand for sander	
2 or 3 Wheelers	
2 Hackers	
Total	

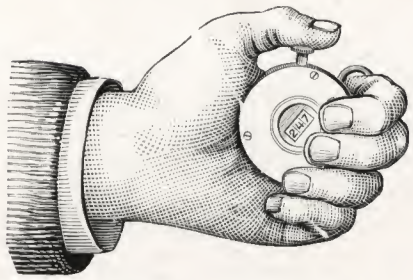
This force places from 25,000 to 30,000 bricks per day under sheds ready for drying.

The Counter for Piece-Work.

The labor for operating our machines is often given out by the thousand, in which case every employee becomes interested in producing the best results. When this is the case, the machines are usually supplied with automatic counters, which count the number of bricks passing the cutter.

The cost of the counter is $30 extra when ordered with the machine.

Tally Register.



The above cut shows the position in which the Tally Register is held in use.

This little register tallies from 1 to 1000, and can be set to zero at will. It is simple in construction, can be carried in the pocket, is about the size of an ordinary watch, and weighs about six ounces. Some brick manufacturers use it for recording the number of car-loads or barrow-loads of bricks made per day, also for recording the car-loads or cart-loads of clay hauled.

BURNHAM BROTHERS, Milwaukee Cream-Colored Brick.

Office: Corner Howell and Potter Avenues.

MILWAUKEE, WISCONSIN.

CHAMBERS BROTHERS COMPANY, Philadelphia, Pa.:

Gentlemen:—We have one of your largest size auger brick machines, with crushers, pug-mill, etc., in use for this past season, and are very much pleased with all. We have been in the brick business all our lives, having always used the soft mud process. We were of the opinion the brick made by the auger machines would not sell in our market, in which we find we were very much in error.

Yours respectfully,

BURNHAM BROTHERS.

OFFICE OF CHAMBERS BROTHERS COMPANY.

CHICAGO, May 25, 1905.

CHAMBERS BROTHERS COMPANY, Philadelphia, Pa.

Gentlemen:—I went with Mr. Anderson to see our new No. 8 Cutter working on the Chicago Brick Co.'s yard. The superintendent, Mr. Hatch, is operating the cutter at a speed which gives him an average output every eight hours of over 205,000 bricks for one machine. I counted the revolutions of the cutting reel a number of times and found the minimum number of bricks cut per minute was 420, and at times when the machine was full of clay and everything running just right, as many as 540 per minute were being cut. * * *

Yours very truly,

E. R. FRAZIER.

VARIOUS TESTS OF BUILDING AND STREET-PAVING BRICKS.

Mr. John McArthur, Jr., when city architect, had made, for the *Commissioners for the Erection of Public Buildings in Philadelphia,* a number of tests to determine the strength of Chambers's machine-made brick as well as of brick work in which these bricks were used. Common building bricks were selected without our knowledge.

Table of Strength for Single Brick.

Page.	Manufacturer.	Quality.	Make.	Total Load Applied.	Crushing Force in Pounds per Square Inch.	Area of Sample in Inches.	Remarks.	Number of Experiment.
7	Dobbins.	Hard.	Machine.	288,500	8,610	33.50	Failure gradually took place.	2559
21	"	"	"	411,000	11,720	35.07	Failed rapidly near close of test.	2587
22	"	"	"	304,000	9,210	33.00	Ultimate strength.	2588
9	Dotterer.	Pressed.	"	256,500	7,770	33.03	" "	2562
25	"	"	"	304,000	9,050	33.60	" "	2595
26	"	"	"	243,000	7,210	33.70	" "	2596

Mechanical tests were made by the *Commissioners for the Erection of the Public Buildings in the City of Philadelphia,* at the Watertown Arsenal, Mass., upon brick piers built from bricks made by the Chambers Machines, laid in both mortar and cement. These tests show that in all cases the mortar or cement gave way at a pressure much less than that at which our bricks crush. Piers of one and one-half bricks square, or four and one-half bricks in section, equalling about 160 square inches in area, gave out as follows:

Abstract of Average Strengths.

In Lime Mortar. *First Crack,* 864.23 lbs. square inch, or 62,226 tons square foot.
In Cement Mortar. *First Crack,* 1567.56 lbs. square inch, or 112,864 tons square foot.
In Lime Mortar. *Ultimate Strength,* 1372 lbs. square inch, or 99 tons square foot.
In Cement Mortar. *Ultimate Strength,* 2141.4 lbs. square inch, or 154.18 tons sq. ft.

JOHN McARTHUR, JR.,
Architect.

Bricks made by *our machines* average about one hundred per cent. more in strength than the same clay made by hand.

WATER ABSORBED BY VARIOUS BRICKS.

NO.	DEGREE OF BURNING.	LOCALITY OF CLAY.	THE PROCESS OF MANUFACTURE.	WEIGHT IN LBS. AND OZS. BEFORE SUBMERSION.		WEIGHT IN LBS. AND OZS. AFTER SUBMERSION.		GAIN IN WEIGHT IN OUNCES.	PERCENTAGE OF WHOLE WEIGHT GAINED.	REMARKS.
				lbs.	oz.	lbs.	oz.	oz.		
1	Hard.	Pea Shore, N. J.	Chambers' "A" machine.	5		5	2	2	2.5	
2	Dark.	"	"	4	15	5	7	8	10.12	
3	Light.	"	"	4	14	5	10	12	15.4	
4	Salmon.	"	"	4	14	5	12	14	17.95	
5	Very hard.	"	Hydraulic press, 600-tons pressure.	2	4	2	6	2	5.55*	* This brick, in the process of manufacture, was submitted to a pressure under a hydraulic press of 121,695 pounds to the square inch.
6	Dark.	"	Dry press.	4	13	5	7	10	13.	
7	Salmon.	"	"†	2	8	3	1	9	22.5	
8	Dark.	Hestonville, Phila.	Chambers' "A" machine.	5	3	5	15	12	14.46	
9	Dark.	"	"	5	5	6	3	14	16.47	† This brick was made by the *dry-clay* process, of the same clay as No. 1, and was exposed one winter to the action of the frost, and had partially fallen, none of the angles being left.
10	Light.	"	"	5	3	6		13	15.66	
11	Salmon.	"	"	5	8	6	8	16	18.18	
12	Salmon.	"	Hand.	4	8	5	8	16	22.22	
13	Light.	"	"	4	10	5	8	14	18.91	
14	Hard.	"	"	4	12	5	8	12	15.78	
15	Salmon.	Neck, Phila.	"	4	8	5	7	15	20.83	
16	Light.	"	"	4	13	5	9	12	15.58	
17	Hard.	"	"	4	11	5	2	7	9.33	
18	Hard.	"	"	4	10	5	3	9	12.16	
19	Dark.	Hudson R., N. Y.	Hall's machine.	4	3	4	6	3	4.47	
20	Light.	"	"	4	2	4	12	10	15.15	

To ascertain the density of Chambers Machine brick in comparison with those made by hand or other machines, brick described above were submerged in water for a period of thirteen days, and the weight of each before and after this test carefully recorded. It will be observed that a hard-burned building Brick No. 1, made by our machine, absorbed only 2.5 per cent. of its weight.

For those interested in the quality and texture of bricks, this table shows many interesting facts.

DATA FROM VARIOUS SOURCES.

Size for Building Bricks.

The dimensions adopted by the NATIONAL BRICK MANUFACTURERS' ASSOCIATION for a standard hard-burned common building brick are 8¼ x 4 x 2¼ inches, and for a pressed front brick, 8⅜ x 4 x 2⅜ inches.

The standard for the city of Chicago as adopted by union agreement is 8 x 3⅞ x 2¼ inches.

Size for Street Pavers.

The *Philadelphia Department of Highways* has made a requirement that street-paving bricks shall measure 8½ x 4 x 2½ inches, with a possible variation of not over ⅛ inch in length or width only.

The *Engineering Department of the City of St. Louis, Mo.,* specify for street paving bricks: 8 x 4 x 2½ inches minimum size, 9 x 4½ x 3 inches maximum size. For paving blocks: 9 x 5 x 3½ inches minimum size, 12 x 6 x 4½ inches maximum size.

Extracts from Report of the National Brick Manufacturers' Association's Committee on Technical Investigation.

Summarizing the work of the series, we present the following:

First.—No conclusion, nor even indication, of the effect which the size of a paving brick exerts on its ability to withstand the shocks and abrasions of the rattler test has been reached.

Second.—This failure of the prime purpose of the series is due to the discovery at the conclusion of the test that the matter of the relative proportions of the brick is of most direct and influential importance on its wearing power, and that no comparison of different sizes of bricks is possible unless the proportions of each size are made practically the same.

Third.—The important lesson to be drawn from the test is that bricks which are designed to endure the wear and strains of usage in the streets should be made relatively thick and heavy set. The practical limit to the operation of this law will be the convenient width, which may not be exceeded without making a street slippery for horses. This limit is probably not more than 3½ inches, or 4 inches at the most. But bricks 3½ or 4 inches thick, and with a coefficient of .100 or above, will outwear, both in test or in street, bricks of thinner design but in all other respects equal.

Proportions of Paving Bricks.

The proportions of paving bricks are shown to be of greater importance in resisting power to blows and strains than the actual size. Large size and faulty proportions will produce a brick more likely to fail in use than small size with proper proportions.

Sizes noted from Different Localities.

Galesburg, Ill., Paving Bricks, 8 x 4 x 2½ inches; Paving Blocks, 8x4x3½ inches.

Canton, Ohio, Paving Bricks, 8½ x 4 x 2½ inches; Paving Blocks, 8½ x 4 x 3½ inches.

Haydenville, Ohio, Brick, 8 x 4 x 2⅜ inches.

New Cumberland, W. Va., Brick, 8 x 4 x 2⅜ inches.

Sciotoville, Ohio, Brick, 8 x 4 x 2½ inches.

Perkiomen, Pa., Brick, 8 x 4 x 2½ inches.

Standard Rattler for testing Street-Paving Bricks adopted by National Brick Manufacturers' Association.

The machine is 28 inches diameter and 18 inches in length, measured inside the rattling chamber. The barrel to be supported on trunnions at either end, and without a shaft passing through the chamber. The cross-section of the barrel a polygon having not more than 16 sides nor less than 12, with spaces between to permit the escape of dust. The heads and staves composed of gray cast iron, not chilled or case-hardened. Belt power sufficient to rotate the machine at the same speed whether charged or empty. The number of revolutions for a test to be 2000, with speed of rotation not more than thirty-two nor less than twenty-four per minute.

The quantity of the charge, estimated by bulk and not by weight, should equal 10 per cent. of the cubic contents of the rattling chamber, and the number of whole bricks whose volume comes nearest this amount constitute a charge.

The bricks selected should be dry and clean and free from any coating tending to protect them from abrasion. The loss should be calculated in per cents. of the weight of the dry bricks composing the charge, and an average obtained from not less than two distinct tests on separate charges.

Quantity of Water required for Brick Works.

A stiff mud brick plant making 50,000 bricks daily and using steam-power should be provided with water supply of about 45 gallons per minute. For a plant of 100,000 daily capacity probably 70 gallons per minute will be found sufficient.

Relative Prices of Different Grades of Building Bricks.

The following prices as prevailing in the Philadelphia market are for deliveries at the building and include an average hauling charge of $1.50 per thousand.

Hand-made repressed red bricks	$20.00	per thousand.
Machine-made repressed bricks	14.00	" "
Hand-made stretchers	13.00	" "
Sanded machine stretchers	11.00	" "
Hard bricks	9.00	" "
Salmon	6.25	" "

Test of Street-Paving Bricks made on the Chambers Machine used by the Diamond Brick and Tile Co., Kansas City, Mo.

Ten different bricks were tested in a rattler, 48 inches long by 26 inches diameter, making twenty-five revolutions per minute during the test, which was continued for forty-five minutes.

With the bricks in the rattler were placed 300 pounds of assorted broken castings.

The loss during the *first fifteen minutes* was almost double that for the remaining period of test. The average result of loss in the rattler during the entire test was .0619 per cent. of weight of brick. Bricks from this company immersed forty-eight hours in distilled water at normal temperature absorbed .0035 per cent. of their weight.

Test of Street-Paving Bricks made on the Chambers Machine used by the McAvoy Vitrified Brick Co., Perkiomen Junction, Pa.

These were end-cut bricks made from red shale and not repressed. The total result of the combined test for cross-breaking strain, crushing test, loss from abrasion, and absorption of water gave the McAvoy pavers a rating of 47.36 points out of a possible 50. The absorption was .99 per cent. The loss from abrasion was 5.8 per cent. after sixty minutes in a 24-inch rattler making thirty revolutions per minute. The crushing strain, 13,702 pounds per square inch.

Analysis of Shale from which a Good Paving Brick is being Manufactured.

	Per cent.		Per cent.
Silica	58.55	Magnesia	1.64
Alumina	17.29	Soda	4.35
Oxide of iron	6.35	Potash	2.55
Water (combined)	5.41	Moisture (free)	0.87
Lime	0.53		

Quality of Bricks made by the Chambers Machines.

The quality of the bricks manufactured by our new machines is peculiar, and is, in our opinion, superior in many respects and for many purposes. This opinion is based upon the following facts:

1. The clay is more thoroughly tempered, and the different strata of clay, sand, and loam are thoroughly mixed through each other.

2. The particles of material of which bricks are usually composed, especially when poor clays are used, vary in size. While the bar is being moulded or formed, these particles of various sizes being all *in motion while under pressure,* the small ones arrange themselves between the large ones, thus filling up the interstices, the finer particles working to the surface; so that a bar formed of comparatively *rough clay* will present a *fine*-grained

surface. Thus we are enabled to get a compact brick, with a good, smooth surface, from an indifferent clay.

3. As the clay is tempered it is gradually compressed, thus making a solid, homogeneous bar, from which bricks are cut.

4. They absorb very much less water.

5. They will save in building about 10 per cent. in wastage.

6. They are very much stronger.

Selecting Clays.

Too much care cannot be taken in selecting clay. Without suitable materials it will be impossible to make a good quality of bricks by any process or machinery. So far as we know, any clay that will make good bricks by hand moulding may be successfully used in our machines, except those of a quicksand nature, that hold so much water that when worked in the machine and pugged become soft, and will not mould into form stiff enough to bear piling on edge.

We have worked in our machine material containing only about 15 per cent. of clay.

It is desirable to have a large body of clay together, so that a few years' operation will not necessitate bringing clay a great distance or moving machinery and fixtures to a new location. Banks that can be drained without pumping are preferable and more economical to work.

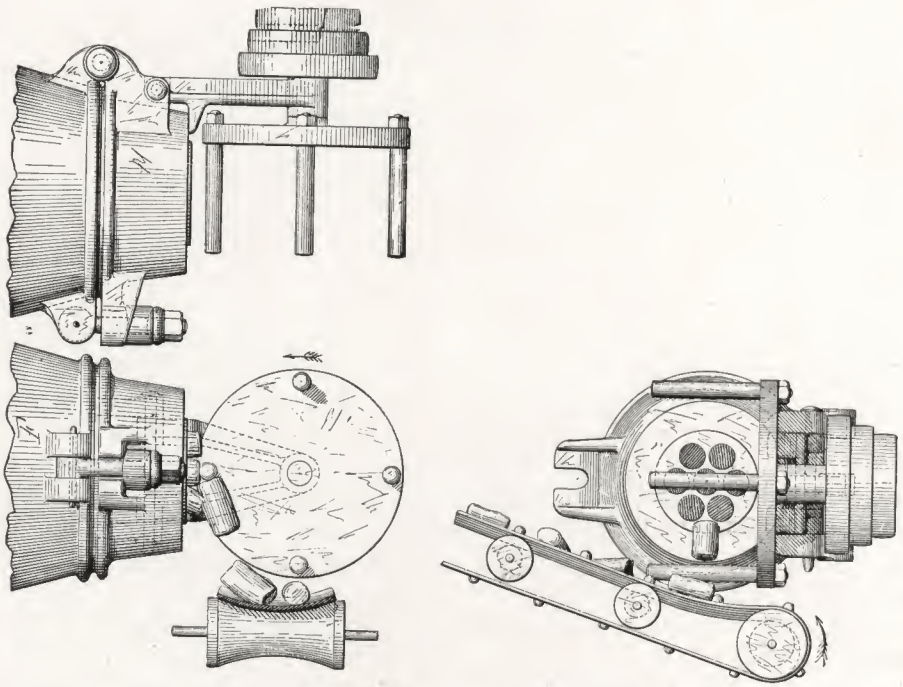
Clay Tests.

While an actual working test of clay on a full-sized machine is not always necessary, we consider this the safest course, and, as a rule, prefer to make such tests at our works before executing orders for brick machines. We keep machines under belt for the express purpose of making tests and obtaining samples of product for customer's approval. From four to six barrels of the material to be worked are required, and this should represent, so far as possible, the average run of the clay bank, and not simply one strata only. This must be shipped to us, freight prepaid, and should bear customer's name in addition to our address. A charge is made for tests, the amount paid, however, being refunded to purchasers of our machinery.

Compression of Iron Ores.

We now have our machine running successfully, compressing *argillaceous iron ores.*

It is well known that often the *best part* of iron ore is so fine that it cannot be smelted in the furnace alone; only a small percentage of it is worked in with the coarser and less rich ores. Sometimes the ores are so argillaceous that they must be washed, and a large percentage of the richest ore thrown away.



Showing the Breaking-Off and Elevating Devices for "B" Machine used in manufacturing Railroad Ballast, Artificial Fuel, and compressing Iron Ore.

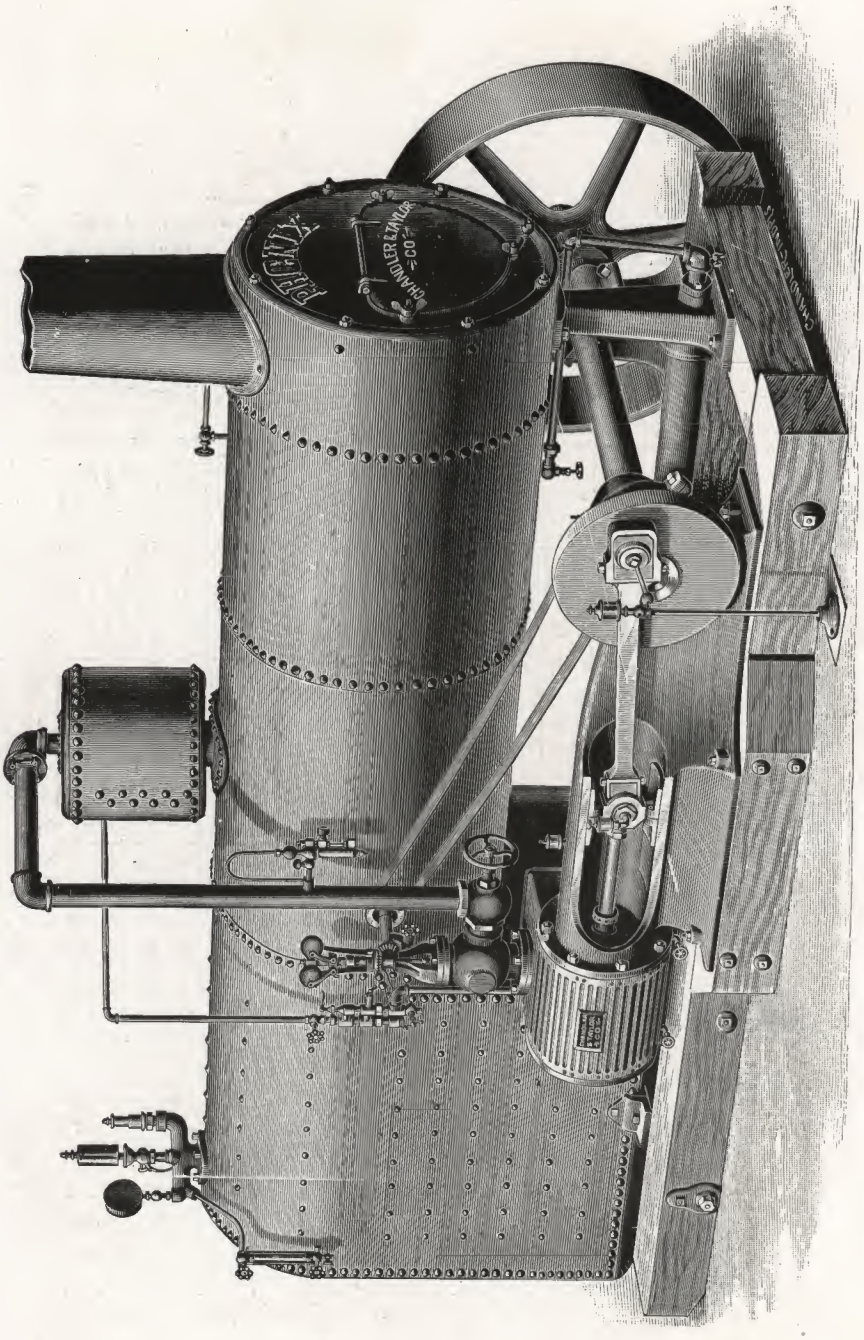
By passing such ores through our machine they are compressed into irregular lumps of any desired size or shape, and are ready to pass direct into the roasters from the machine without any manual labor whatever.

Semi-Portable Power Outfit.

This design in semi-portable outfits, we believe, more completely combines the advantages of a stationary with those of a portable than any plan heretofore presented. It is an exceedingly simple design, and cannot fail to be appreciated. The boiler is of the locomotive type, mounted on heavy timbers, to which the engine also is attached; these timbers, with the weight of the boiler and its contents resting on them, form a substantial foundation for the engine. The pop-valve whistle, steam-gauge, water-gauge, and gauge cocks are all placed at the fire-box end of the boiler, within easy reach and directly in sight of the fireman. A feed-water heater is attached to the boiler, and water is supplied through it by an independent feed-water injector, which admits of the use of the boiler for steaming or other purposes, entirely independent of the engine. The engine used in this combination has all the good features of a self-contained engine, and has a throttling governor and all the requisite cocks, valves, and oil-cups to make it complete and ready for operation. (See illustration, page 152.)

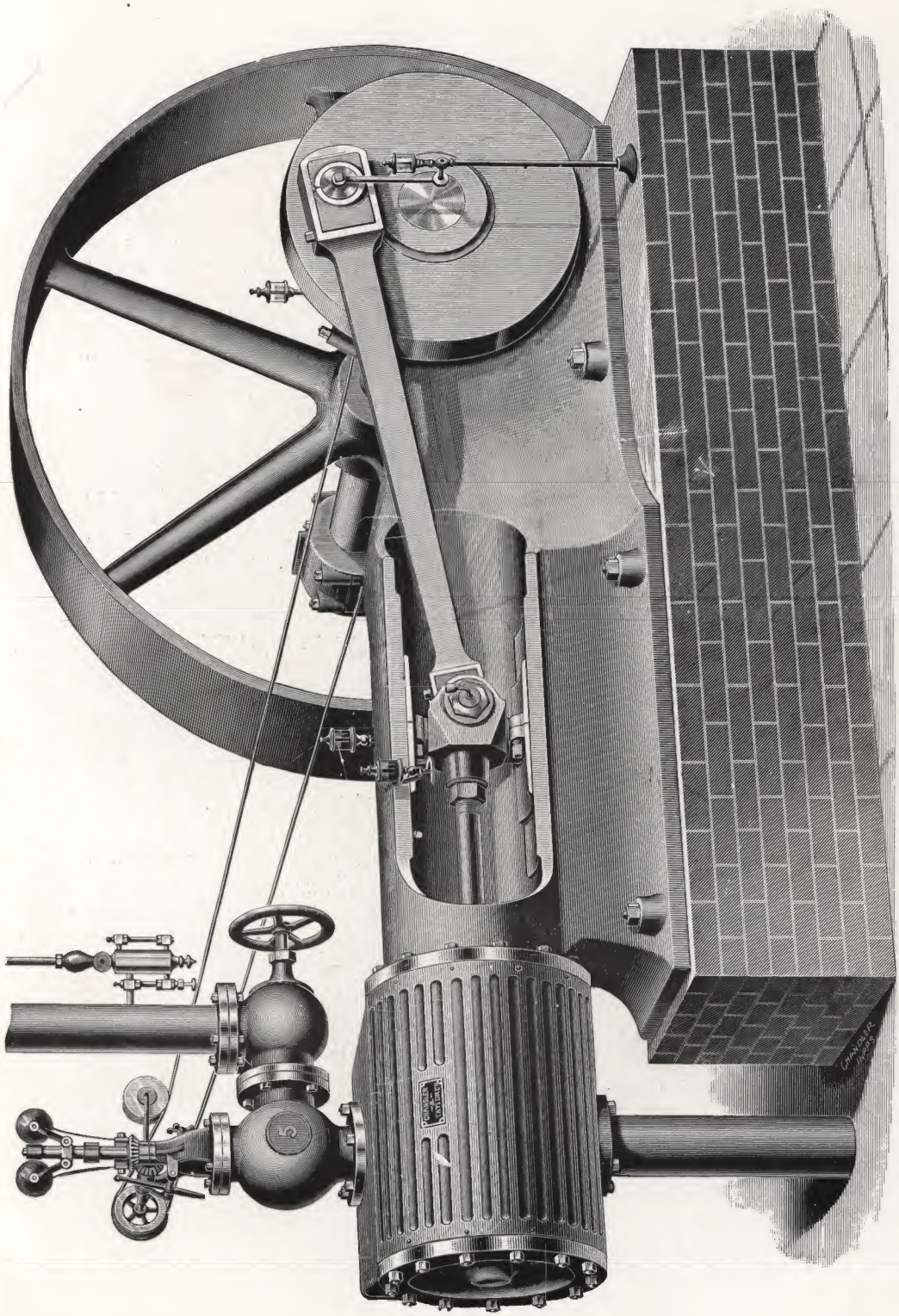
Table of Sizes for Semi-Portable Engines and Boilers.

Nominal H. P.	Diameter of Cylinder. Inches.	Length of Stroke. Inches.	Diam. of Fly-Wheel Pulley. Inches.	Face of Fly-Wheel Pulley. Inches.	Diameter of Crank Shaft. Inches.	Medium Speed.	Length of Fire-Box. Inches.	Width of Fire-Box. Inches.	Height of Fire-Box above grates. Inches.	Diameter of Waist. Inches.	Number of Tubes.	Diameter of Tubes. Inches.	Length of Tubes. Inches.	Thickness of Shell. Inches.	Thickness of Butt Sheet. Inches.	Thickness of Tube Sheets. Inches.	Diameter of Chimney. Inches.	Length of Chimney. Inches.	Number of Iron in Chimney.	Estimated Weight on Sills. Pounds.
15	7	10	40	8½	3⅜	240	42	25	21	30	32	2¼	72	¼	$\frac{5}{16}$	⅜	12	17	16	5700
20	8	10	44	10½	3⅜	240	42	28	26	33	41	2¼	84	¼	$\frac{5}{16}$	⅜	14	20	16	7200
25	9	12	48	12½	4⅜	200	48	31	28	36	54	2¼	84	¼	$\frac{5}{16}$	⅜	16	20	16	9200
30	10	12	54	12½	4⅜	200	54	31	31	36	43	2½	108	¼	$\frac{5}{16}$	⅜	18	23	16	9950



Semi-Portable Engine and Boiler.

(See description and table of sizes on pages 150 and 151.)



Single Throttling Engine.

We offer a line of thoroughly well made engines with a well established reputation for good material and workmanship.

A Gratifying Result from a Long-Distance Shipment.

HONG-KONG, CHINA, April 4, 1900.

MESSRS. CHAMBERS BROS. Co., Philadelphia, Pa., U. S. A.:

Gentlemen:—The brick machine you supplied us last year has now been working for several months and has made nearly three million of bricks. Its working has been altogether satisfactory.

When we commenced operations, I took an intelligent coolie (laborer) and showed him how to regulate the supply of water, etc. In two days he was able to turn out material of uniform density, and after using up a dozen safety-pins, everything went well.

One of the most satisfactory points about the installation is that the pugging is so perfect that only 15 per cent. of water is required to make a coherent brick. We expected 20 per cent. would be necessary. As this water has to be evaporated at a cost of so much coal, the 5 per cent. saved is a very important item.

The working out of every mechanical detail about your machines is admirable and a source of pleasure to me every time I see them.

The friction clutches justify all you write about them. They have completely overcome my prejudice against the substitution of a clutch for fast and loose pulleys.

There is every prospect of our enlarging our plant this year, and I hope shortly to indent for another mixer and brick machine.

Please receive herewith some views of our works, which may interest you. I am sorry that it is not possible to get another photograph of your brickmaking plant.

I remain, gentlemen,

Yours faithfully,

(Signed) W. H. HEWITT, *Engineer.*

Premiums Awarded the Chambers Brick Machine.

The Pennsylvania State Agricultural Society awarded a silver medal, it being a *"discretionary premium" for ingenuity, usefulness, and merit.*

The American Institute, New York, awarded us a *silver medal* for the *best* bricks, which bricks were made on our machine, and a *gold medal* for the *best* brickmaking machine.

The Philadelphia Centennial Exhibition awarded a medal and certificate.

The Southern Exposition, held at Louisville, Ky., awarded us a medal for "Best Display of Brick Machinery" and a certificate for the "Best Car for Transporting Green Brick."

The Franklin Institute of Philadelphia, after a most thorough examination by the Committee of Science and the Arts, and three months' publication, soliciting evidence of want of novelty, awarded by the Scott's Legacy *premium* and medal for our new machine, a premium seldom awarded.

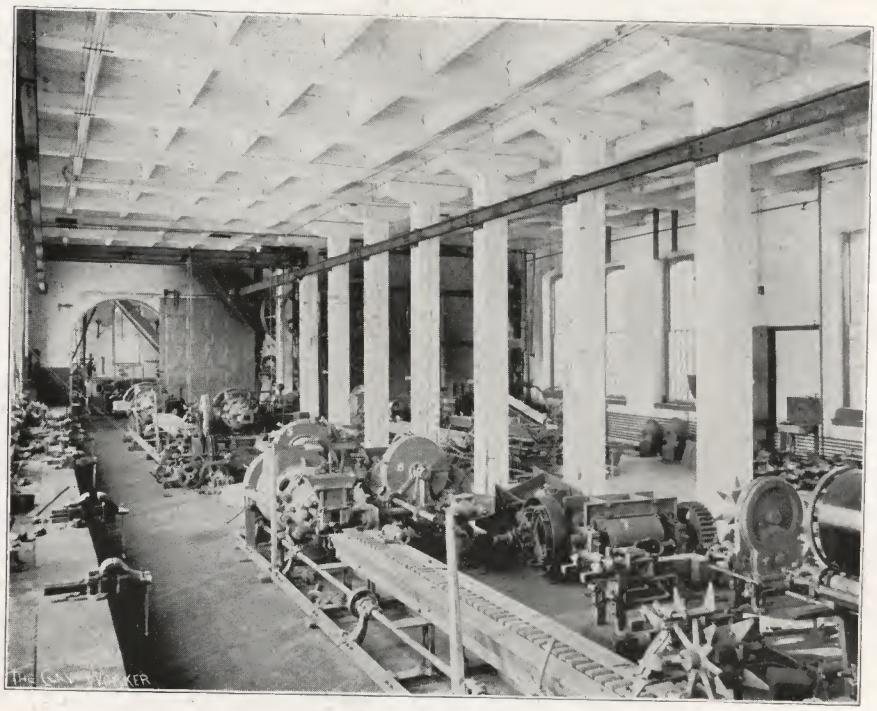
The Tennessee Centennial Exposition awarded us a medal for the "Best Collective Exhibit of Brick Machinery."

Chambers Brothers Co.'s Machine Works. Front View.

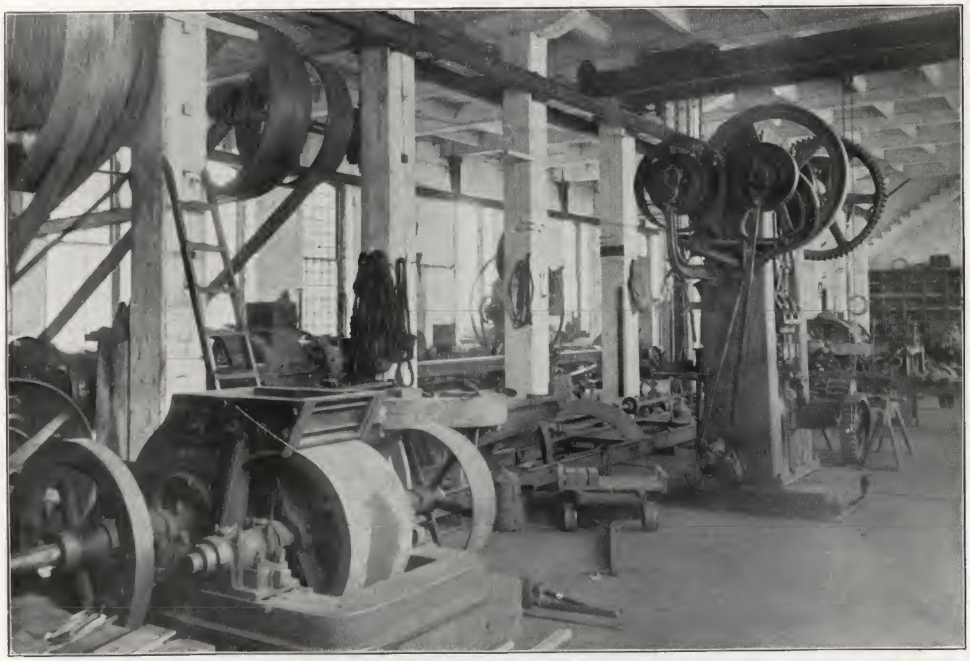
Our Factory.

We have erected and fitted up an establishment expressly for the manufacture of machines of our invention, and shall be pleased to receive visits from our customers or those interested in using machinery in our line. Our works are located in the western part of the city, at the corner of Fifty-second and Media Streets, being two blocks south from Fifty-second Street Station on the Pennsylvania Railroad, and may be reached by train in about ten minutes or thirty minutes by Arch Street trolley from the business centre. We have here our main office, with well-equipped drawing rooms, a complete pattern and wood-working shop, machine shop, forge shop, and foundry.

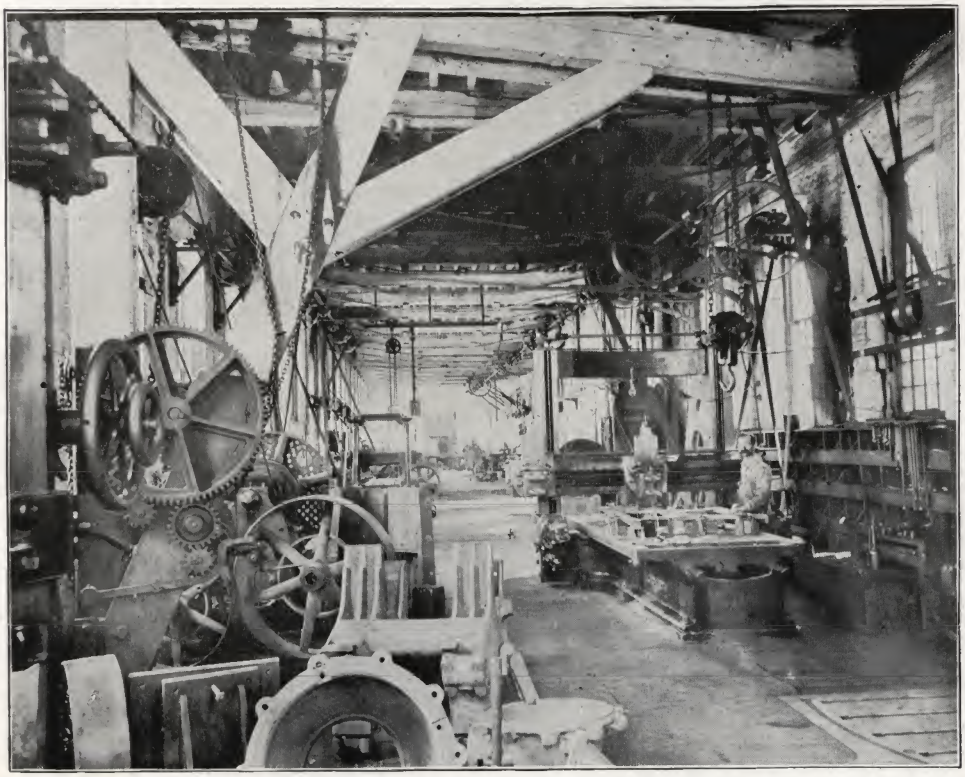
We are equipped with many tools designed expressly for our work, a private electric-light plant, and ample room and facilities for serving our patrons in the best possible manner.



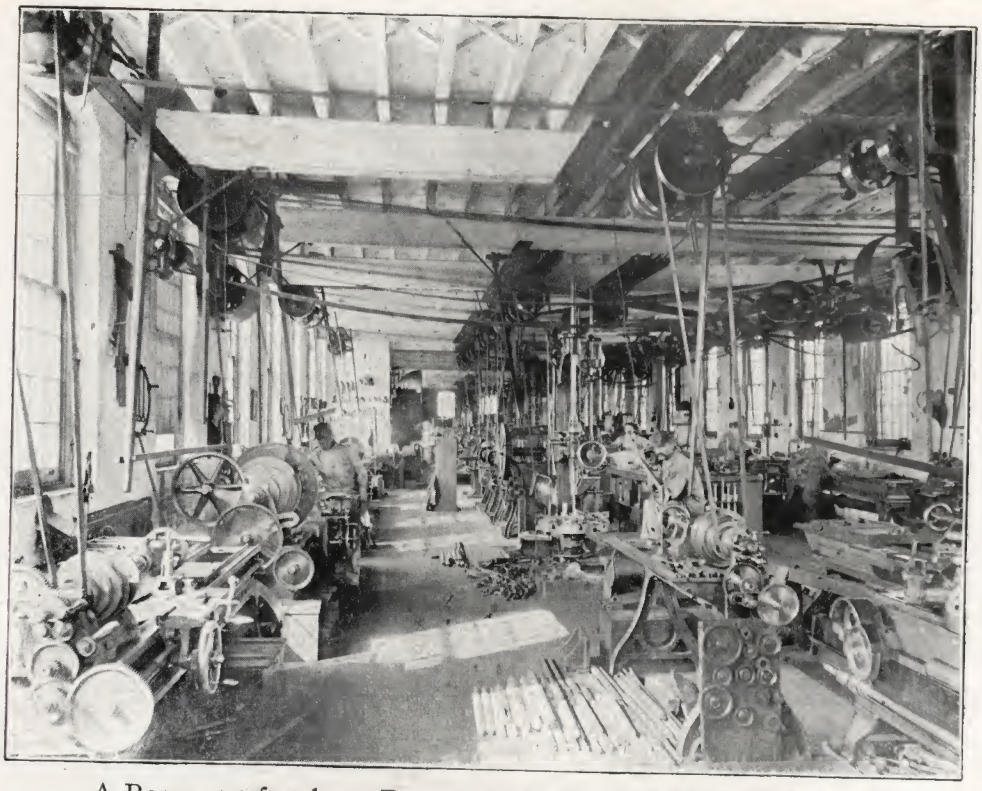
East End of Erecting Floor, Media Street Shop.



West End of Erecting Floor, Media Street Shop.

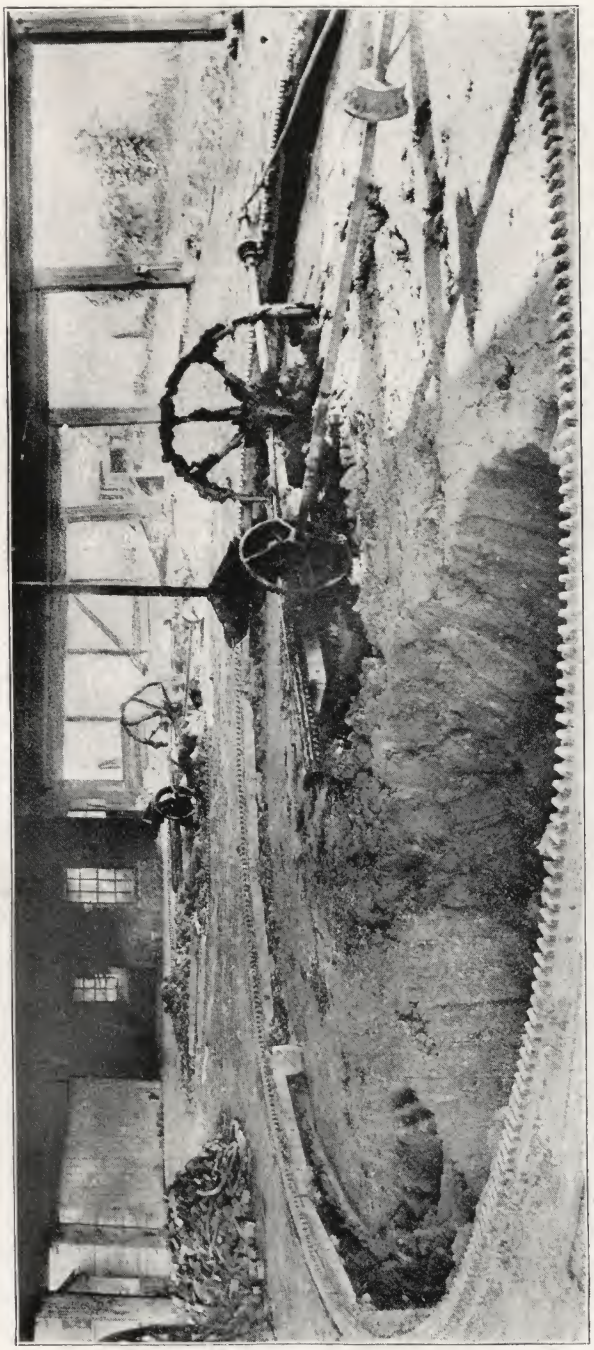


First Floor of Tool Shop, Fifty-second Street.



A Room 175 feet long, Devoted to Lathes and Milling Machines.
Second Floor, Fifty-second Street Shop.

One Corner of the Iron Foundry.

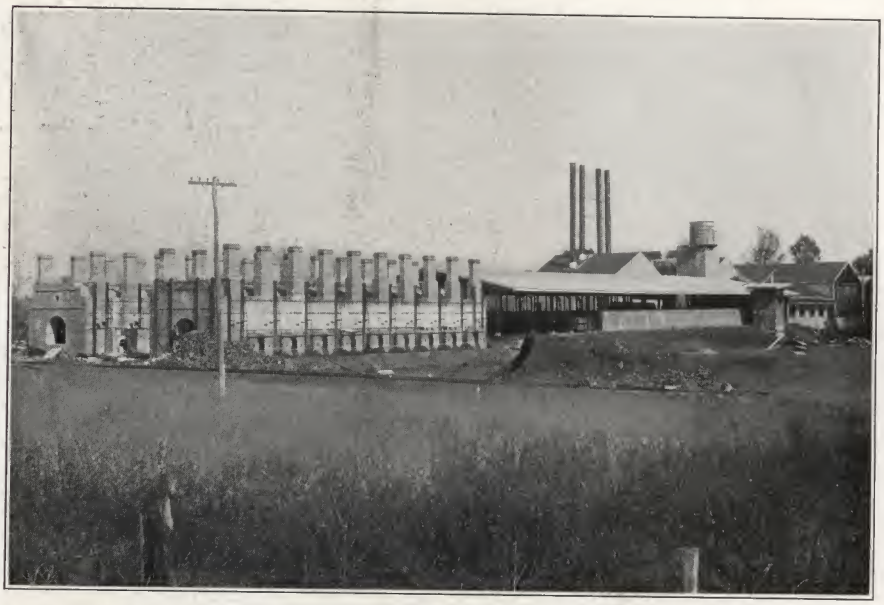


Photographic view of a Ring-Pit Tempering Wheel for grinding clay for moulding by hand.

Works Plans.

We have planned the arrangement of machinery for some of the most successful plants engaged in the manufacture of common building brick, and offer our facilities for this work to our customers. We also make general yard plans showing proper location of buildings, kilns, sheds, etc., and frequently re-arrange old works to handle the product to better advantage, incorporating improved methods while giving due consideration to the value of existing equipment. The accompanying plates are merely suggestions of some of our work in this direction. Our preference is to study local conditions in each case and make special plans for each outfit.

CHAMBERS BROTHERS COMPANY,
Philadelphia, Pa.

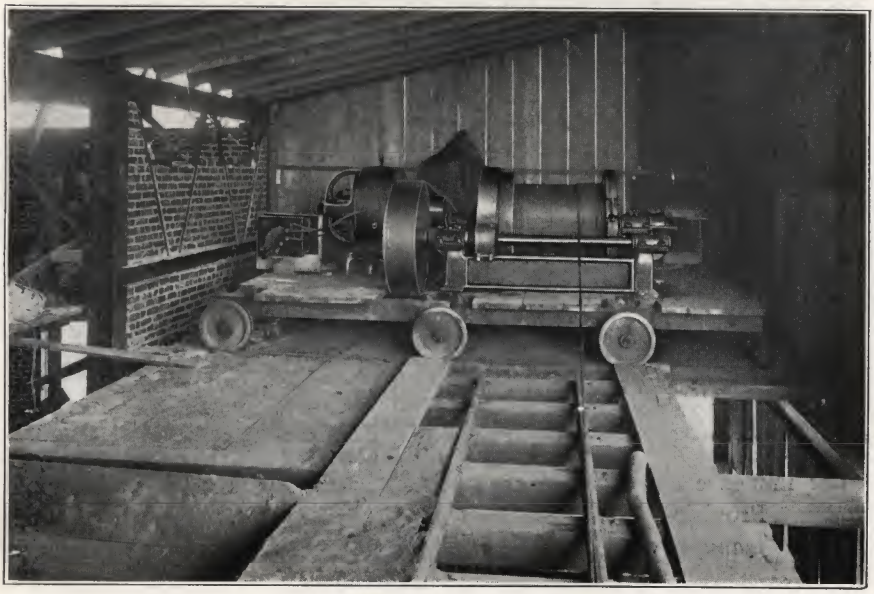


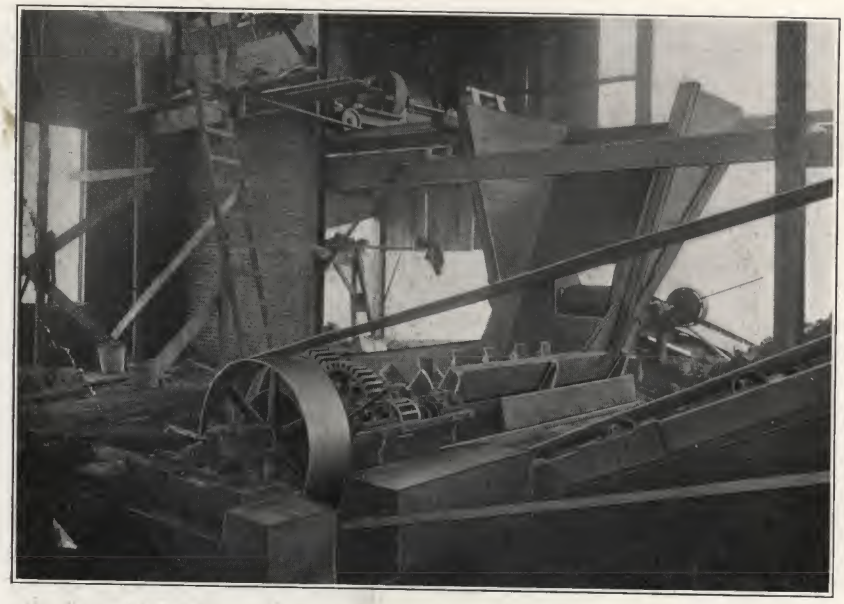
View During Construction of Plant of
The Independent Brick Co., Trenton, N. J.

One of the best plants in the country for the manufacture of building brick from clay.

From Steam Shovel in Clay Pit to Machine House, at the plant of INDEPENDENT BRICK Co., TRENTON, N. J.

A Chambers Geared Friction Hoist with Electric Motor Drive is mounted upon a Transfer-car for convenient shifting to any of several possible positions in the large clay storage house.

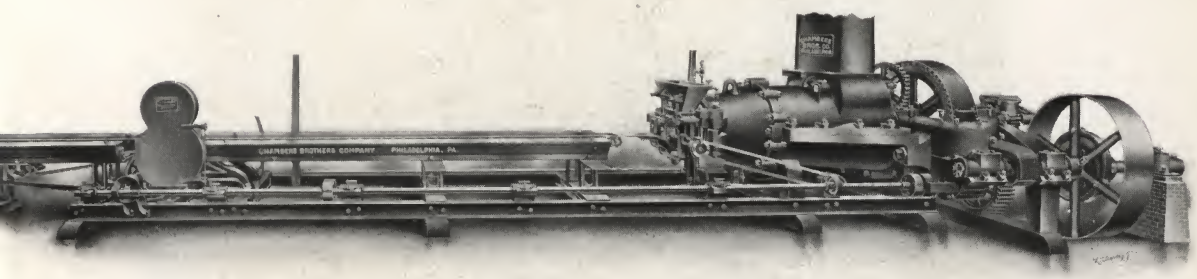




At certain seasons of the year clay is discharged from cars directly into the large Chambers's Granulator and Feeder.

The immense clay storage shed with steel trussed roof is kept supplied with clay. Provision is made to feed the Granulator from the stored supply, so that the *manufacture of brick* may be independent of weather conditions.

Brick walls with steel trussed roof make a most admirable building for the business. A factory producing upwards of 100,000 bricks daily is worthy of a roomy, light, well ventilated work shop.



A Chambers No. 7 End Cut Brick Machine

runs continuously and performs its part in the plant of the Independent Brick Co., Trenton. N. J.

The Artificial Brick Dryer, using heat from cooling kilns, is constructed of steel and brick with concrete ceiling. The Manager rests easy knowing that "a fire in the Dryer" won't destroy his brick plant overnight.

Electric lights are available when needed and all distantly located or isolated machines such as blowers and vapor exhaust fans are driven by independent electric motors. Both Down Draught and Continuous Kilns are used.